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EDITED BY

JOSEPH CARSON, M.D.
Prof. Mat. Med. in Phil. Col. Pharm.

AND

ROBERT BRIDGES, M.D.

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THE

AMERICAN JOURNAL

OF

PHARMACY.

APRIL, 1840.

ORIGINAL COMMUNICATIONS.

ART. I.—REMARKS ON HYDRATED PER-OXIDE OF IRON.

By William R. Fisher, M. D. Late Professor of Chemistry and Pharmacy in the University of Maryland, &c. &c.

The peroxide of iron has recently acquired an importance in its therapeutical and pharmaceutical relations, from its use as an antidote against arsenious acid, which renders any apology for the notice here intended to be taken of it altogether unnecessary. Indeed, some notice of its properties as an antidote, mode of preparation, and preservation, seems to me to have become indispensable, from at least one erroneous view in regard to it, which appears still to prevail, and which may in some degree restrict its use and diminish its value. This error consists in the belief that the antidote, to be effectual, must be *freshly prepared:* a dictum which reached our shores simultaneously with the knowledge of the peculiar properties, as regards arsenious acid, of the oxide itself. Subsequently, each one who has written upon this subject has attached value to this italicised caution, and has thus perpetuated, at all events until now, a direction which has a tendency to banish or exclude a valuable remedy from the shops, and to compel the unfortunate victim of malice or accident to await the hurried preparation of the means by which his pangs may be allevi-

ated. And this fresh preparation, too, has been required in the same breath in which we are told that not a moment's time should be lost in the administration.

Having contributed in some measure to the continuance and extension of this belief, in a table of poisons and antidotes, prepared for the General Therapeutics of Prof. DUNGLISON, published in 1836, it appears to be my particular duty to disabuse the pharmaceutic and medical public of this impression, and to show that the fresh preparation of the hydrate of peroxide of iron as an antidote to arsenious acid, is not necessary, and that any such view of its character is unsustained by sound philosophy or experience.

It is not necessary that the various authorities for the use and successful employment of this antidote should be here reviewed to establish its value. Enough has already been shown in other journals to satisfy the most incredulous, and it is only necessary to refer those who may yet need information on that score, to the contents of this Journal, Vol. 10, page 263, and the American Journal of the Medical Sciences, Vols. 15, 16, 20, 23, 24,* for experiments and cases which must prove fully satisfactory. Considering, then, its value as an antidote established by these records, let us examine the substance chemically, and see in what manner its character, composition, or properties can possibly be so altered by age or exposure, that its use would be rendered fruitless. It consists of iron combined with oxygen, and in those proportions, too, in which of all others these substances delight to combine. Into which combination, not only iron itself, but all its compounds containing less oxygen, spontaneously pass, when exposed to the air for any length of time; in other words, when kept. This state of oxidation, then, is that in which it is not difficult to retain the metal, and is one

* Vol.	15,	page 537,	reported	by	Drs. Bunsen and Berthold.
"	16,	" 239,	"	"	Prof. Orfila and Dr. Leger.
"	20,	" 222,	"	"	Mr. John Robson.
"	23,	" 503,	"	"	Dr. John Murray.
"	24,	" 243,	"	"	Dr. Deville.

from which the metal does not spontaneously pass by exposure or prolonged keeping.

If it undergo no change from these causes, how can age affect it, or why must it be fresh? Will the carbonic acid of the atmosphere, by combining with it, neutralize its properties, and thus affect its value? Such is not the case. Peroxide of iron has less affinity for carbonic acid than the protoxide, so much so, that the precipitated carbonate of iron, which is a protosalt, when first formed, loses nearly all its acid, by its base passing to the maximum of oxidation, as is well known, and established beyond a doubt. If kept with any kind of care, carbonic acid is the only acid to which the oxide could be exposed, and we have seen that carbonic acid opposes no barrier to the preservation of the oxide. Theory, then, affords no reason why the antidote should be *freshly prepared.* Experience gives us an equally strong reason against it. In the latter part of September, or beginning of October, 1837, I was called upon in great haste for some *freshly prepared* antidote for arsenious acid, for a patient suffering from the poisonous effects of arsenic; with all possible expedition the antidote was prepared, but too late for the relief of the victim; although no time had been unnecessarily lost, the patient expired as the first doses were administered. During this preparation, which was the first I had made of this oxide, it occurred to me forcibly, that if it were suffered to remain diffused through the water in which it had been washed, that it would always be in the condition of a recent precipitate, and, in accordance with this view, it was so put aside. The antidote remained in the laboratory of the University of Maryland, unnoticed and untouched, except on one occasion, when it was exhibited to the medical class of the ensuing winter, as a specimen, until June 1st, 1838, when I was called upon by my friend, Dr. Thomas, for some of the antidote. Having none other to supply him with but this, prepared, at the least, eight months before, recourse was had to it. The result of its use is detailed by the doctor in the American Medical Library and Intelligencer, of July 16th, 1838. It is only ne-

cessary here to say, in regard to it, that the patient for whom it was employed, recovered.

The cases here quoted, serve the double purpose of showing the fatal consequences which may result from the loss of time consumed in the preparation of the antidote, and that *freshly prepared* hydrated peroxide of iron is not necessary to render arsenious acid insoluble and innocuous.

Theory and experience, then, both concur to sustain the position which I assumed at the commencement, and, I trust, will induce those whose province it is, to be constantly prepared with the means which have been shown to be worthy of firm reliance. Did not our knowledge of the properties of peroxide of iron teach us that it can undergo no change by age or exposure, I should not rely so confidently upon the single case known to me; but the result in that case was so exactly in conformity with the inductions from theory, that it deserves to be regarded as positive evidence.

Independently of my own observations, the experiments of Dr. Von Specz,* Professor of Chemistry in the Theresian Academy of Vienna, sustain the opinion herein advocated, by showing, 1st, "that this preparation, when properly made, and preserved in bottles, with good glass stoppers, will retain its virtues for a very considerable time." 2d, "that rust of iron, and hæmatite, although they do not prevent all the bad effects of arsenic on the system, may, in defect of the hydrated peroxide of iron, be employed as antidotes to that poison." And the case reported by Mr. John Robson† also corroborates this view. He having no hydrated peroxide of iron at hand, administered six drachms of the carbonate of iron in water, in two draughts. "The patient said his stomach felt cooler. His pulse fell from 130 to 112. The pain ceased, or nearly so." Now it will be observed that in none of the cases here referred to, was *freshly prepared* hydrated peroxide of iron the agent by which the antidotal effects were

* American Journal of Medical Sciences, Vol. 21, page 519.

† " " " " " 20, " 222.

produced. Dr. Von Specz employs the powder in all his experiments with the hydrated oxide, which could not have been an immediate preparation, finds that it can be preserved a considerable time, and finally discovers that other peroxides may be used in default of the hydrate, one of which is as old as the creation, the other, age unknown. It is true the hydrate is always to be preferred, but its place can be supplied. Dr. Robson also gave the hydrated oxide as soon as it could be got ready, (an hour and a half after the carbonate was given,) but his patient had been already relieved by the *old* preparation, first swallowed. The recent preparation was not *well washed,* and many urgent symptoms supervened upon its use. "He (the patient) said he felt sick, and worse after taking the physic." The next morning, the prepared oxide, more carefully washed, was given. "It was not so good to take, but he had no more sickness," &c.

These, then, it is asserted, prove that age is no obstacle to the effects of peroxide of iron; that it can be kept, and that the precipitated peroxide must be thoroughly washed. It can scarcely be necessary to remind the readers of a scientific journal that the carbonate of iron, and hæmatite, are almost wholly peroxide of iron. The former containing a trifling amount of carbonic acid; the latter, perhaps, some siliceous or earthy matter. My own view is, that these would be equally efficacious as antidotes, if in an equally impalpable state, with the precipitated peroxide.

The only possible reason which I can conceive for requiring the oxide to be freshly prepared, is that it may be administered in as finely divided a condition, as nearly approaching solution as possible; and this certainly can only be accomplished by employing it in the pulpy state of a recent precipitate. This state is, however, not inconsistent with age, and may always be preserved, for any reasonable length of time, as I know by experiment, simply by suffering enough of the water with which the precipitate has been washed, to remain, in order that the oxide may be diffused through it. So very minutely divided is the oxide in its precipitated state, that a trifling

agitation serves to distribute it promptly through the supernatant fluid, which thus forms a medium for its administration, as well as a means for apportioning the dose. This mode is that which has been employed in the preservation of all the hydrated peroxide which I have ever made. Theoretical considerations induced me to employ it, counter to the dictum against which I now write; and experience, in the case already quoted, so fully satisfied me of the advantages to be derived from it, that I at once commenced the preparation of a large supply of the antidote, so that any future case might not be deprived of the benefit which can be obtained from its immediate use. Some of the oxide, prepared in June, 1838, is now by me, and to all appearance is entirely unchanged. No critical examination could distinguish it from a preparation a week old. Several friends, who have seen it, concur in this opinion.

It was my intention to have here rested the argument, but just as it was completed, I was indebted to the kindness of Mr. Durand, who, ever anxious for the diffusion of information, and the improvement of our science, placed in my hands the twenty-fourth volume of the "Journal de Pharmacie," Paris, 1838, containing a communication from Drs. Bunsen and Berthold, "*On the mode of preparing in the most convenient form the Hydrated Sesquioxide of Iron, as an Antidote to Arsenious Acid.*" To these gentlemen we owe this employment of the hydrated oxide, and I therefore, with the greater pleasure, adduce their testimony in favor of the views which have been herein urged.

As the subject now under discussion is in regard to the preservation of the oxide, the latter portion of their paper is first quoted, in their own words: "It is altogether inconceivable," say they, "that any one, relying upon uncertain experiments with animals, should have recommended the preservation and use of the antidote in a dry state, since a number of experiments already made, coinciding with our own, tend to this result, that the action of the sesquioxide of iron is null, and that of the *dry* hydrate incomplete; of which, the

simple fact that the dry hydrate does not ever precipitate, wholly, in the cold arsenious acid, should have previously apprised every one."

"The recommendation to dry the product seems to arise from the erroneous opinion, that the hydrate undergoes a change, and loses its efficacy by long preservation. We have it in our power to refute this view of it, since we have found that a precipated hydrated sesquioxide obtained from carbonate of iron, enclosed in the cavity of a mass of travertin (sedimentary carbonate of iron,) removed from under water, had preserved its efficacy, notwithstanding the geological conditions of the mass of travertin, demonstrated that many ages, at least, ought to have rolled over since its deposition took place. This precipitate of the sesquioxide owes its action altogether to its gelatinous hydrated state, which was perfectly preserved under the bed of water, beneath which it was deposited. It would, however, be a great error to attribute the same efficacy to dry ochre, to bog iron ore, (fer oxidé des marais,) or to the argillaceous oxide of iron; these substances, from their mode of aggregation, are equally inert, with the deposit produced in the water, in which smiths cool their iron, which is not a hydrated sesquioxide, but a deposit of the mixed oxides. This last substance is not even inert, on account of its sharp corners, which would prove a source of dire consequences."

There is an apparent difference of opinion between the value of the peroxide, as employed by Dr. Von Specz, and the authors here quoted, but so far as regards the necessity of a recent precipitate, they concur, and fully sustain the opinions which I have advocated. Dr. Von Specz, indeed, requires that the oxide shall be administered in the form of an emulsion, in which, if properly prepared, it must be completely divided and thoroughly diffused.

The conclusions, then, which I consider established, both by the evidence here offered, and the absence of evidence to the contrary, are,

1st. That we are justified in believing that peroxide of iron undergoes no change from age, by inferences drawn from the known great affinity of iron for oxygen.

2d. That the discovery of native peroxide, entirely unchanged, affords positive testimony of the foregoing position.

3d. That relief has been afforded by the use of the peroxide of indeterminate age.

From which, as a necessary consequence, it follows that neither reason nor observation sustains the opinion that the precipitated hydrate of peroxide of iron *must be freshly prepared* to render it available as an antidote to arsenious acid.

In regard to the precipitated hydrate of peroxide of iron, it is proved,

1st. That, owing to its state of aggregation, when moist, it is the preferable form in which to administer it as an antidote.

2d. That it should be well washed before being so employed.

3d. That the extemporaneous preparation of the antidote is inadvisable, because time is lost in the administration, beside the inability to wash it.

4th. That the hydrated peroxide of iron can be preserved any length of time unaltered, and ready for immediate use by suffering it to remain diffused through a portion of the water in which it has been washed, corked up in bottles.*

And lastly, That every apothecary, and physician residing in the country, should always be provided with the antidote thus preserved in bottles of a convenient size for use.

Enough, has now, certainly, been said to establish the position which I undertook to demonstrate, and a few comments upon the mode of preparation are now offered. Several modes have been suggested for the preparation of this oxide, which, although varied in detail, are essentially the same in princi-

* These first, second, and fourth positions receive additional strength from the directions given by Drs. Bunsen and Berthold for making this oxide. They will be mentioned further on, and although not italicized in the text, have been so printed here to distinguish them.

ple: effecting the oxidation of the iron to its maximum extent, by the decomposition of nitric acid, and precipitating the oxide thus obtained by ammonia.

It is unnecessary to review these formulæ in detail, further than to indicate a few reasons for the preference given to the formula here proposed. If nitric, or nitro-muriatic acid be employed as the solvent of the iron, as prepared by one author, violent and inconvenient action, and great heat, attend the operation, and the clothing and utensils of the operator encounter some risk. To this objection our formula is not exposed. And the direction given by the same authority for "*drying the powder in the shade*," is entirely inconsistent with our whole object, the preservation of the oxide in a pulpy state. Another writer, anonymous, it is true, but one who evidently understands his subject, offers two formulæ for this preparation. The former of which, with the exception of not affixing quantities, coincides exactly with our mode of preparation, although nothing is said by him of preservation, and one expression of which is quoted in his own words, because reference will shortly be made to it: "The alkali throws down the hydrated peroxide as a reddish precipitate, which must be carefully washed." In his second process he speaks of its extemporaneous preparation, "by boiling aqua fortis in a common iron pot, with some iron filings or nails, for a few minutes, pouring off the clear liquor, and then adding to the fluid a saturated solution of carbonate of soda, the hydrated peroxide will be precipitated in the form of a reddish powder. A saturated solution of the nitrate of iron, as also of the carbonate of soda, may be kept in separate bottles in the office of a physician, and the antidote made whenever required, by merely mixing a portion of each solution with the other." To this formula and recommendation there are two objections, of which one may be regarded as serious, viz.: that by this extemporaneous preparation the oxide is not washed, and the highly irritated, if not inflamed, mucous coats of the stomach and œsophagus are deluged with a concentrated solution of nitrate of soda, "whose irritant properties," says Professor Ducatel, in his

Abridgement of Christison, "will be found, most probably, to produce the same effects on the animal system as the nitrate of potassa." Such analogy should certainly deter us from the use of the extemporaneous preparation. Indeed, the author himself says above, in his first formula, the precipitate "must be carefully washed," indicating his own views of the necessity of removing the new alkaline salt, and exhibiting a decided inconsistency between his formulæ, which nothing but an accidental oversight could have caused.* The other objection to this formula is of less importance and has already been suggested in the first comment made upon the use of nitric acid for dissolving the iron.

It is believed that no objection of moment can be made to the proposed formula, herein commended; indeed, the chief defects in those already reviewed, arise from the anxiety to employ the preparation in its recent state, which it has been the object of this notice to prove unimportant. That it did in one case at least deprive the sufferer of its benefits, and, consequently, of his life, I am fully persuaded; and seriously have I regretted having given implicit credence, without proper reflection, and a recurrence to principle, to the idea that only a freshly prepared oxide could be relied upon.

The formula now offered is definite in its proportions, and if carefully observed, will furnish a result upon which reliance may be placed. It is based upon the equivalent proportionals of the materials, and is made to coincide as nearly as possible with the preparations of the United States Pharmacopœia, the officinal acids being employed. At my request it has been subjected to practice by Mr. Durand, who has

* It may appear hypercritical to allude to the irritant properties of these nitrates, when so powerful an irritant as arsenic is to be counteracted, and if their presence was unavoidable, the comment might be attributed to an ultra disposition to find fault; but, as it has been shown that the properties of the antidote may be enjoyed unattended with accompanying irritation, these remarks are made with an honesty of purpose which, it is trusted, will be ample to disarm them of any apparent malice or discourtesy to the author.

obtained a very perfect result, with a satisfactory economy of material.

Hydrated Peroxide of Iron.

℞.—Sulphuric Acid,	(67° Baumé,)	8 oz.	16 parts.
Iron Wire,		8 oz.	16 "
Nitric Acid,	(49° Baumé,)	5½ oz.	11 "
Water of Ammonia,		q. s.	
Water,		1½ gal.	384 "

Mix the Sulphuric Acid with the water in a glass vessel. Add the Iron, and, after the effervescence has ceased, filter. Add the Nitric Acid in divided portions, and apply heat so long as orange colored fumes are given off. To the heated solution, pour in the Water of Ammonia until a decided excess has been added, then wash the precipitate by decantation, until the washings give no precipitate with Nitrate of Baryta. The water is then to be drawn off until just enough remains to give the consistence of thick cream. It should be introduced into bottles of convenient size for use.

Bottles containing half a pint are recommended as convenient; and the annexed direction, it is thought, will enable the most ignorant to use it until medical advice can be obtained. "This antidote must be administered *as soon as possible* after the discovery that arsenic has been taken, and as it produces no bad effects itself, should be given *every five or ten minutes, until entire relief is obtained.** The dose for a grown person is a table-spoonful; for children, a dessert spoonful. The bottle must be well shaken before each dose."

The following remarks on the preparation are from the paper of Drs. BUNSEN and BERTHOLD. After giving directions for the preparation, by means of sulphuric acid, iron,

* It is considered better to administer it thus in doses until relief is obtained, than to endeavor to give four, eight, or twelve times the amount of arsenic taken, which, for obvious reasons, can seldom be known.

nitric acid, and ammonia, without specifying proportions, they proceed: "It is necessary not to lose sight of the fact, that the solution of the salt of iron must be complete before adding the nitric acid in small quantities, otherwise, a considerable amount of a neutral sulphate of peroxide will separate in the form of a yellowish powder, which is very slightly soluble. The chloride of iron affords a means of preparing this body still less eligible, because the risk is run in precipitating, by ammonia, of obtaining an admixture of a large quantity of subchloride of iron."

"*In order that the hydrated sesquioxide may not be deprived of its water, and by this means of diminishing, in the least possible degree, its feeble state of aggregation, it should not be filtered, but after having been suffered to subside for several days, the supernatant fluid being poured off, it must be preserved under water in closed vessels.*"

"Simple as is the process here indicated for the preparation of the antidote, there have been, nevertheless, modifications proposed, some of them so unfit that we believe it useful to add some remarks on this subject. First of all, there is one practice which ought to be rejected, that of employing another alkali than ammonia for the precipitation of the hydrate of the sesquioxide of iron, as some have done; in fact, the least quantity of alkali retained in the precipitate will give rise to the formation of an arsenite, which would abstract itself entirely beyond precipitation by the hydrate of sesquioxide of iron, because, although this base can prevail over the affinity of ammonia for arsenious acid, it could not over that of soda or potassa."*

The subject is now submitted for the deliberate examination of the two professions who are interested in its determination, and upon whom no greater reward can be bestowed

* This may have been the mode employed by Dr. Robson, whose patient found himself worse after having been relieved, upon using an imperfectly washed precipitate; and felt no pain after using some which had been well washed. See Amer. Journ., Vol. 20, page 222.

for the labor of the investigation which it merits, than the reflection that they are about to increase their ability for usefulness, and to divest the dreadful anticipation of poison of some of its risks and horrors. In treating this important question, my sole motive has been the promulgation of truth, and banishment of error; and in combating the opinions of many who are entitled to the highest respect and confidence, I have deemed it indispensable to my own immunity from a charge of rashness, to produce evidence of the strongest character, depending upon facts which, it is believed, cannot be refuted. The introduction of therapeutical considerations has been avoided as much as possible, and only employed when essential to establish the value of particular preparations, and to enlighten pharmaceutical research.

Philadelphia, March 27th, 1840.

ART. II.—ON THE POWER OF SACCHARINE SUBSTANCES IN GENERAL, AND UNCRYSTALLIZABLE SUGAR IN PARTICULAR, OF PROTECTING THE SOLUTION OF PROTIODIDE OF IRON FROM DECOMPOSITION. By William Procter, Jr.

To be able to protect the solution of protiodide of iron from decomposition, and, consequently, to preserve its medicinal power unimpaired, has been a desideratum to the medical practitioner, as owing to the gradual but certain process of reduction of the strength of the solution, this preparation is one to which the physician is compelled to look with suspicion, not on account of any original want of power in the remedy, but by reason of the process of deterioration which is constantly progressing, often, notwithstanding the recommended precaution of keeping metallic iron in the solution. It is true that, when this is done in a proper manner, there is

a mere transfer of iron from the protecting metal to the iodine of the decomposed salt, as it is gradually effected, while its base is deposited in the state of peroxide. But even allowing this protecting power to be fully exercised, the ferruginous deposit, making the solution turbid, not to speak of the iron filings or wire, renders it inelegant, and frequently subjects the apothecary to the inconvenience of filtering the solution before dispensing it.

Thus far we have been viewing the subject within the precincts of the apothecary's store, but the most serious difficulties yet remain to be considered, viz.: after the remedy is placed in the hands of the patient. Some pharmaceutists take the precaution to introduce small quantities of metallic iron into the vials of the solution before selling it, but this is by no means general. As the remedy is taken in small doses, and its exhibition sometimes continued through considerable periods of time, the frequent opening of the vial, not to say the liability of leaving it unstopped, as must often be the case, causes the decomposition to go on rapidly when it is not in contact with iron. In corroboration of these remarks, I have the testimony of one of our first physicians, who informed me that he had discontinued the use of this preparation in his practice, in consequence of its great variation in strength.

I have deemed it proper to make the foregoing remarks as introductory to the following observations and experiments, which were made with the object of discovering a remedy for the evils which we have seen detailed.

The agents employed belong to the saccharine substances. The first application of one of this class of substances as a protective agent in pharmaceutical manipulation, was by VALLET, in his now celebrated ferruginous pills.

Shortly after the formula for his preparation was published in this country, I gave a process for preparing a tincture of *protomuriate of iron*, (Vol. X. p. 272, of this Journal,) which was kept in the state of a protosalt, through the intervention of honey. It was this idea which suggested the power of the same agent in preserving the solution of protiodide

of iron, and the sequel will show how far the suggestion has been realized.

As it is our duty at the time we are pursuing a course of investigation, to note *all* the phenomena that offer, perhaps it will be well to give an idea of the *relative* protecting power of several saccharine substances, so as to be able to appreciate their importance, and to ascertain, if possible, some general principle which will account for the variation in their protective power.

The substances tried were sugar of milk, manna, cane sugar, honey, and uncrystallizable sugar.

The uncrystallizable portion of honey and molasses was obtained by mixing the honey or molasses with twice its weight of alcohol. The cane sugar precipitates, if molasses is employed, and the crystallizable honey, if honey is used, and by evaporating the solution, the preparation is obtained free from alcohol. They should be decolorized as much as possible, by boiling with animal charcoal, before being used.

1st. The power of sugar of milk and manna in protecting the iodide is very slight, although they each may possess the property in a limited degree. The trials which were made, however, offer convincing proof of their inadequacy to perform the purpose in view.

2d. Three drachms of the solution of protiodide of iron was mixed with one drachm of simple syrup, and placed in a vial exposed to light and air. In a similar vial a like quantity of the solution was placed without the addition of syrup, and equally exposed to air and light. At the end of forty-eight hours the saccharine solution remained transparent, possessing its original color, while the other had acquired a brownish hue. They remained thus exposed to air and light for two weeks—at the end of that period the unprotected solution had deposited a considerable quantity of peroxide of iron, and was strongly charged with free iodine. The saccharine solution was also colored, but in a very slight degree, with an equally small deposit of ferruginous oxide, but we must be

aware that this occurred after a full exposure to *air and light* for two weeks.

3d. Three drachms of the solution, as before, was mixed with two drachms of simple syrup, and the mixture exposed for five days to air and light. On examination, the solution remained perfectly unaltered, not communicating the slightest tinge to starch water, or exhibiting any precipitate whatever.

The vial was then corked, and left exposed to the light. Twenty-two days after the commencement of the experiment, the first evidence of free iodine was manifested, and to this time, nearly two months from that date, the solution remains so little altered that the presence of free iodine is hardly perceptible, and the deposit of oxide equally minute; there being none whatever on the sides of the bottle.

4th. Three drachms of solution of protiodide of iron was mixed with one drachm of honey, and the mixture filtered, to render it perfectly transparent, and then exposed to air and light for three days without being the least affected. Twenty days after, the solution remained unchanged, and one month had elapsed before the slightest trace of free iodine could be detected. Two months after decomposition had progressed so tardily, that if no other protective agent existed, this would be better than iron.

5th. Three drachms of the iodous solution were mixed with one drachm of uncrystallizable honey. The mixture was treated precisely as in the last experiment, and was found to answer more effectually than the unaltered honey.

6th. Three drachms of the solution, as before, was mixed with two drachms of uncrystallizable sugar, (of molasses.) The mixture was then exposed several days to light and air without the slightest alteration. Nearly two months have elapsed since the beginning of the experiment, and not the slightest trace of free iodine, or of oxide, have been separated, notwithstanding it has been tested twenty times with solution of starch.

7th. To exhibit the protecting power of these agents more pointedly, two vials, with wide mouths, were nearly filled

with filtered starch water; to one was added a few drops of the protected solution, to the other an equal quantity of the unprotected solution of iodide of iron. At the end of twenty-four hours the presence of free iodine was rendered evident in the latter by the blue color acquired by the starchy solution, whereas the former remained colorless.

8th. Thinking, notwithstanding the present protective power of the agents, that the increased temperature of summer might cause fermentation, and thus render the protector worse than useless, four ounces of the solution, protected with uncrystallizable honey, was placed in a vessel of water, the temperature of which varied from 80° to 100°, Fah., for nine days. At the end of this period no signs of fermentation were evidenced, and no free iodine existed in the solution. The exposure to heat was then discontinued, under the impression that if disposed to ferment, the solution had ample time to give notice of it.

It remains now to offer a formula for the proposed preparation. The strength of the following is that proposed to be adopted at the late convention on the Pharmacopœia:

℞.—Iodine, ...	ʒxi.
Iron filings, ...	ʒiv.
Syrup, ...	
Uncrystallizable honey, or	
Uncrystallizable sugar, . . .	℥iv.
Distilled water, a sufficient quantity.	

Mix the iodine with eight fluid ounces of the distilled water, and gradually add the iron filings, stirring constantly; then apply a gentle heat until the solution shall have acquired a light green color, or shall not give a blue color to the solution of starch, then add whichever of the three protecting substances may be chosen, and continue the heat a short time, and filter. Lastly, wash the filter with as much distilled water as will make sixteen fluid ounces of solution of protiodide of iron.

When either sugar or honey is used, the color of the solu-

tion is very little altered, while it is rendered much more palatable.

To the physician, the foregoing remarks are believed to be fraught with advantage, as it gives him the power to control the efficiency of his remedy by merely directing a quantity of simple syrup to be mixed with the solution, when he has reason to believe that it is not done previously, and increasing the dose proportionably. To the pharmaceutist it offers to be equally beneficial, by rendering a preparation, hitherto uncertain and inelegant, permanent in its medicinal power, and free from a sedimental deposit, which, he will admit, adds nothing to the appearance of his bottle.

ART. III.—ACCIDENTS FROM ARSENIC. By John Millman.

The frequent accidents which occur from the great facility of obtaining arsenic for destroying rats, and also for criminal purposes, render it incumbent upon all those who vend the article to adopt such measures as would enable any one to detect its presence in the ordinary articles of food, &c., it might be mixed with.

In France, where the legal restrictions imposed upon the sale of poisons are infinitely more strict than we can ever expect them to be in this country, we find gentlemen of our profession deeply interested in this subject, and recently Mr. Grimeau's plan has been submitted to the consideration of the Pharmaceutical Society of Paris. Mr. G. proposes to color all the arsenious acid, sold in commerce under different denominations, with a mixture of sulphate of iron and cyanuret of potassium; the minute proportions of a hundredth part of each of those substances would suffice to impart such striking colors to the various articles of food, &c. which it might have been mixed with, as would at once serve as a caution to the least experienced eye. In cases where the above preparations had

been given with criminal intent, judicial investigations would be much aided, inasmuch as the coloring effect would last several days.

Should arsenic be needed to mix with lime, for seeding, "chaulage," Mr. G. recommends, in addition to the above, spirits of turpentine; and for medicinal and veterinary purposes, oil of lavender, in sufficient quantities to give a very strong odor to the mixture.

How far Mr. GRIMEAU's plan would tend to diminish the evil under consideration, is a matter well worthy our deep solicitude. Perhaps it may be in our power, by the adoption of some such precautionary measures, to supply the want of legislative action upon so important a subject.

This is also a proper occasion to remark upon the distressing occurrences occasioned by laudanum, and the stronger preparations of opium, which are so heedlessly placed within the reach of all, without any safeguard. Could not some regulations be adopted with regard to these also? Such as selling those preparations in vials, so strikingly different from those in common use as to secure the attention of the most negligent. Here, also, it must be admitted, a reform is needed: how often has laudanum been given for paregoric, although the vial has been labelled as the law directs?

ART. IV.—NOTE UPON GENTIANA CHIRAYITA.

To the extensive and well known family of Gentianeæ, belong numerous species which are valuable for their medicinal qualities. Although closely resembling each other in botanical characters, they are equally remarkable for the similarity of property, connected with their bitterness, which universally pervades them, and which, with few exceptions, permits the substitution of one for another, when employed as medicines. In the Flora of every explored region of the earth, are found one or more individuals which have been ascertained to possess the qualities of the class in an eminent degree, and on this account have been selected to occupy a place in the list of the Materia Medica peculiar to that region. The species under consideration is a native of India, whence it has been brought to Europe, and, within a few years, has attracted some attention. The information we possess of its history and virtues is derived from several sources; upon these we draw for the remarks to be presented to our readers.

The following are the names given to it by different authors:

Gentiana chirayita.—Roxb. *Hor. Corom. and Asiat. Researches.*

Henricea pharmacearcha.—Lem. Lis. *Bul. Soc. Philom.*

Swertia chirayita.—Hamilton.

Description.—This plant is herbaceous, two or three feet high, branched; the stems are woody, as thick as straws, round, smooth, and jointed, containing a large medullary canal, of a yellow color; the leaves are amplexicaul, lanceolate, acute, entire, smooth, and three or five-veined; the flowers are yellow, in terminal spikes; the corolla is five-parted.

It has no odor, and the taste is very bitter. In the Linnæan arrangement it belongs to the class *Pentandria,* order *Digynia.*

Chirayita is found upon the Coromandel coast of the Peninsula, and in the district of Nepal.

We are informed by PEREIRA that it is imported into England tied up in bundles, and that the plant is pulled up by the root, about the time the flowers begin to decay, and when the capsules are well formed. That which we have received is cut into small fragments.

Dr. AINSLIE says, what appears in the bazaars of Lower India, under the Tamul name of *chayret toochie*, are small stalks, of a light gray color, and very bitter but pleasant taste.

An analysis of the plant has been made by LASSAIGNE and BOISSEL, who present, as their results, the following composition: resin, yellow bitter matter, brownish-yellow coloring matter, gum, malic acid, chloride of potassium, sulphate of potassa, phosphate of lime, and oxide of iron.

In India it is employed as a stomachic in dyspeptic complaints, and as a febrifuge in intermittents. According to ROXBURGH, it is prescribed as a substitute for cinchona, when that bark cannot be procured. The credit of making it known in Europe appears to be due to M. LESCHENAULT. Beside the tonic power which, like all its congeners, it possesses to a considerable extent, others have been claimed for it, which, if verified by experience, will much enhance its value as a remedial agent; we fear, however, that partiality for a new substance has carried its advocates too far in their encomiums, as it exhibits too little difference of composition, when compared with other species of gentian, for the existence of marked difference in properties. Thus, Dr. CURRIE has supposed "that he recognised in it an especial action upon the abdominal organs, especially upon the liver, for, during its use, the stools became more bilious, the complexion clearer, and he was induced to employ it in obstructions." And in his lectures, published in 1838, Dr. SIGMOND will be found to employ the following language: "It seems that not only does it act upon the stomach, imparting to it a greater degree of vigor, so that the increase of the gastric juice is attendant upon it, and thus the first process of digestion promoted, but the secretion of the liver is materially improved by it, for I have always found that, where it has been given, the stools

have speedily acquired the healthy tinge of bile, and also the muscular activity of the bowels has been increased, for the peristaltic action becomes more regular, and performed with more decided periodicity." "Its beneficial effects are generally more permanent than the greater number of bitters, nor does it, as most of the barks, woods, and roots which we employ for dyspeptic states, and for all that host of morbid affections which depend upon disordered function of the stomach and bowels, ever constipate the bowels, or interfere with the healthy function of the liver; on the contrary, it corrects the secretion of the bile, and gently operates on the bowels." And again, "I have often found chirayita very much to be preferred to sarsaparilla, when large quantities of mercury have been taken, and often, after salivation has been produced, the system more quickly recovers its lost equilibrium than from the use of any other drug with which I am acquainted. It has likewise been strongly recommended in leucorrhœa, dependant upon a general relaxed condition of the female frame; it has even been called a specific remedy. At that period of life in which the menstrual secretion is about to disappear, and in which there is great carefulness to be remembered, lest the employment of medicines injudiciously may lay the foundation for disease of the uterus, or in the mammæ, this tonic is very effectual; it produces no determination to any of the organs, but combines the power of invigorating, with that of removing obstructions." Whether this is a high wrought picture of the effects to be derived from the therapeutic application of this new remedy we leave to be determined by future observations.

Chirayita yields its virtues to water and alcohol. A concentrated infusion is productive of nauseating and irritating effects upon the stomach; that made of the strength of half an ounce of the plant to the pint of water, is sufficient for all purposes.

A formula is given by Dr. Sigmond for the preparation of the tincture, which is, to macerate five ounces of the chirayita for fourteen days in two pints of proof spirit. "This contains

all the powers of the herb; it forms a very strong but very pleasant bitter, by no means unpalatable. It is grateful to the stomach, and diffuses throughout the system a general warmth." The dose is a tea-spoonful.

If given in substance, the dose is one scruple, powdered.

Another point of interest connected with this plant arises from the circumstance of its having been supposed by GUIBOURT to constitute the *Calamus verus* of the ancients. This supposition is based by him upon its characters. It has been shown, however, by FEE, by drawing a parallel between the description of the two plants, that such an assumption cannot be relied on, as the characters of *Calamus verus*, which are given by THEOPHRASTUS, DIOSCORIDES, and PLINY, have no correspondence with those of gentian, and the sensible qualities also are different. J. C.

ART. V.—ON SALEP. By AUGUSTINE DUHAMEL.

THE term Salep is applied to a preparation which is made from certain bulbous roots belonging to plants of the tribe *Orchideæ*, and which commerce brings to us from Natolia, a province of Asiatic Turkey, and Persia.

The orchideous plants are very numerous, and are supposed to exceed fifteen hundred species. They belong to the class *Gynandria*, and are remarkable for the anomalous structure of their flowers, from the circumstance of the pistils and stamens growing united together. They are found scattered throughout the face of the globe, and in all countries not remarkable for extreme frigidity or dryness. They grow most luxuriantly in the hot, damp parts of the East and West Indies, Madagascar, the humid forests of South America, and similar situations in Europe. They are noted for their extreme beauty, singular variety, and delicious perfume. The different species vary a great deal in the aromatic principle

pervading their flowers. Some of them diffuse a very mild and pleasant odor, some none at all, others a highly fœtid odor.

The roots of the orchis are fibrous, accompanied by one or more round or elongated bulbs; in some species they are palmate or digitate. The stalk of the orchis issues from a tuber which nourishes it, and by consequent gradual exhaustion becomes withered. But in proportion as the stalk begins to spring out from the tuber, it sets off, between several simple radicles, a new tuber, which increases in size and outlives the stem as well as parent tuber, so as to propagate the species. The withered tuber continuing to exist, while its successor, for the following year, is in process of developement, causes the number to be double during nearly all the time of vegetation.

The species from which salep has been most commonly obtained are the *Orchis mascula, pyramidalis, latifolia, maculata, morio, conopsea, hircina, fusca,* and others, but principally from the first mentioned of these, which is the most abundant. Independently of these, the *Ophrys anthropophora, apifera, arachnitis,* &c., likewise produce it.

Salep, as we receive it, is exhibited in the form of small masses, resembling pebbles, strung together, from the size of a grain of coffee to an almond, ovoid in shape, of a yellowish-white or gray color, sometimes semi-transparent, and of a horn-like fracture. These masses are so very hard as to be with difficulty reduced to powder. The powder is grayish-white, and gifted with a feeble odor, somewhat like melilot. In taste it is like gum tragacanth, sometimes slightly saltish. These physical characters which give it so much the appearance of a gum, are reasons why salep was not supposed, for a long time, to be a root, until attention was drawn towards it by Matthieu de Dombasle, Geoffroy, Retzius, and other contemporaneous writers, who succeeded by experiments upon the Orchis indigenous to France, in discovering a method of preparing the bulbs in such a manner as to render them identical with Oriental salep, and thereby established the possibility of its culture in France with advantage. The

mode of preparation, recommended by Mr. M. De D., is in substance as follows:

Choose the most favorable moment to gather the Orchis, which is when the plant begins to fade, and the bulb of the preceding year almost entirely withered. About this time the bulb destined to reproduce the plant, and which is the one employed, has acquired its full growth. If sooner taken, it loses more than half its weight when dried, and the salep is of inferior quality. The same is the case if you await the maturity of the seed; from this moment the germ which bears the new bulb already begins to develope itself; vegetation is prepared for the following year, and before winter the bud is so lengthened as to be ready to shoot up from the ground.

The preparation of salep should be commenced as soon as possible after the bulbs have been pulled up. For this purpose choose the largest bulbs, clean them by separating the small roots, scrape the exterior skin, and throw them in fresh water to be washed; then string them, bead fashion, and boil in a large quantity of water, until you perceive that some of the bulbs become transformed to mucilage, which ordinarily takes place in twenty or thirty minutes. When the ebullition is not sufficiently prolonged, the salep retains a very strong and disagreeable taste. Afterwards they are dried by means of a hot sun or stove. The last is best, the action being more prompt, and the chance of fermentation removed. Mr. De D. says that the indigenous salep prepared by him was similar in appearance, and equal in quality, to the best foreign salep.

Various writers have at different times given their attention to a chemical investigation of the dried salep, but one only to the constituent principles of the recent bulb. Mr. M. De D. published an Essay in the *Annales de Chimie* as far back as 1811.

According to this author, the same principles are common to all the Orchis species. They are mostly distinguished by a peculiar, penetrating, venomous smell, which he compares to sperm, originating from a volatile oil, which may be separated by treating the fresh bulbs with alcohol. By distillation, the

alcohol passes off without any sensible odor, but developes the strong odor towards the close of the operation. By continuing the evaporation to dryness, over a gentle heat, their remains an acrid, bitter, inodorous, resinous extractive, which dissolves equally in water or alcohol, attracts moisture, and burns with much puffing, but inflaming with difficulty.

The substance of these bulbs, after being treated by alcohol, contains nothing but mucilage, mixed with a small quantity of fibrous matter. If small fragments of the fresh bulb be steeped in water, they swell up largely, become transparent, and preserve their form like gum tragacanth. Upon looking through one of these fragments, minute, slender fibres will be perceived. Suffered to remain a longer time in water, a further absorption will take place, and the whole be resolved into very thick mucilage, exhaling the peculiar venomous odor, and in which the fibrous portion will form the three or four hundredth part of the whole weight.

According to Guibourt, but in opposition to the opinions of several chemists, the recent solid tubers are composed, very nearly like all the farinaceous roots, of a large quantity of starch, which, examined with the microscope, and colored by iodine, is in uniform grains of an ethereal blue, spherical or elliptical, and about the size of the large grains of wheat starch. This starch does not contain any interior substance soluble in cold water, like wheat or potato starch, but is entirely filled with a pulpy matter, insoluble in cold, but swelling, and becoming much divided in boiling water, which, agreeably to the views of Mr. G., explains the abundance and great consistence of the jelly of salep. The rest of the root is composed of thick membranes colored yellow, very small gelatinous-like globules, transparent and colorless, and very often needle-like points, which disappear upon the slightest addition of nitric acid. These last are phosphate of lime, according to the experiments of Raspail. The prepared salep of commerce, as examined by Caventou, was found to be composed of three substances, of which the respective quantities might be cited

in this manner—*little gum, very little starch, and a great deal of bassorine.*

A discussion arose some years ago among the members of the Pharmaceutical branch of the School of Medicine, respecting the existence of fecula in salep. VAUQUELIN asserted that the tubers enclosed an abundance of it, having collected from the roots of the French Orchis some very fine starch. ROBIQUET contested this point, inasmuch as he had not succeeded in discovering a vestige of it in his experiments upon several Orchis of that country. Not being able to agree in this matter, they came to the conclusion that the same organ might contain fecula, or be totally deprived of it. This difference may have been occasioned by ROBIQUET having examined a withered tuber, but which previously contained fecula until sacrificed to the nourishment of the stalk. The same deficiency of fecula occurs in the new bulb if too young. This inconsistency proves how little this principle influences the nutritious properties of salep, and from its existing in so small a quantity when detected, we may fairly deny its claim to be ranked along with the amylaceous substances, where we generally find it in books of Materia Medica, from its having been supposed to consist of almost pure fecula.

Besides the observation of CAVENTOU, the experiments of PFAFF and others prove it to consist almost wholly of vegetable mucilage, and in nearly every respect analogous in composition with gum tragacanth. The discovery of traces of starch in some specimens of this last substance carries out the analogy still further.

Salep, by prolonged ebullition, dissolves in a transparent mucilage, and when the powder is mixed with water a similar mucilage is formed without the aid of heat, swelling and absorbing a large quantity of water.

Hydrochloric acid dissolves the mucilage, rendering it very fluid. Nitric acid converts it into oxalic acid.

GUIBOURT says that if salep be mixed with water, containing iodine, and then submitted to microscopic examination, there will be perceived some unaltered grains of fecula, con-

sisting for the greater part of teguments, swollen, torn, and gelatinized, and of a magnificent blue, indicating that the salep has not undergone a simple immersion in water, but has remained a certain time.

Desirous of ascertaining, by experiment, how far salep would comport in its chemical properties with gum tragacanth, agreeably to the best existing analysis, I made the few following experiments, the results of which confirm the supposed analogy between the two substances, and at the same time corroborate the statement of Caventou.

Thirty grains of powdered salep, mixed with four fluid ounces of water, rendered it highly mucilaginous; more water was added to it, and the whole set aside in a glass vessel for a short period, when an insoluble, thick, gummous portion was deposited, which, though it increased in volume, was not dissolved by further additions of hot or cold water. The transparent liquid portion, treated by reactives, gave copious flocculent precipitates with subacetate of lead and alcohol; was rendered blue by tincture of iodine, and became clouded with oxalate of ammonia. The insoluble portion treated with boiling water, and tested with nitrate of silver and corrosive sublimate, gave slight precipitates. Iodine produced a very deep color, depositing the iodide of starch soon after.

Thirty grains of salep, boiled with four ounces of water, made a very thick, transparent jelly: cold water mixed with a portion of this jelly was rendered opalescent and mucilaginous; suffered to rest, the insoluble portion, inclosing black, fimbriated specks, (fibrous matter of De D.,) soon fell to the bottom. Chloride of tin produced a white precipitate with the decanted viscous liquid.

One hundred grains of salep gave, by incineration, only four grains of fixed principles, composed, according to Caventou, of chloride of sodium, phosphate of lime, and some traces of a sulphate. Hence, it will be perceived that salep ranks more properly among the vegetable mucilages.

Salep possesses analeptic virtues, and has been long known to the Orientals for its nourishing and restorative properties.

It is employed in the form of powder, which is boiled in water or milk to the consistence of a thick jelly, which is then sweetened and aromatized to suit the palate. It is frequently incorporated with chocolate, which increases its nutritive powers. It is perfectly innocent of the aphrodisiac virtues which have been ascribed to it, but has been found highly serviceable in chronic diarrhœa.

It is officinal in the French Codex, where a method is given for its pulverization. It directs the salep to be steeped in cold water for twenty-four hours, to be well wiped with a rough towel, to remove the cortical portion, then dried in a stove, and lastly, reduced to fine powder.

It is very little known in the United States, and its use consequently very limited. Its high price may form some objection to its employment as an alimentary substance, but could some little attention be given to the production of salep from our North American Orchis, of which there are a number, it would well repay the time and labor bestowed upon it.

SELECTED ARTICLES.

ART. VI.—REMARKS ON SEVERAL OF THE FORMULÆ OF THE UNITED STATES PHARMACOPŒIA. By DAVID STEWART, Pharmaceutist, Baltimore.

SINCE the last revision of the United States Pharmacopœia, there has not, perhaps, occurred a theory which will have a more important influence in improving its formulæ, than that of the application of the displacement process to the preparations of tinctures, aqueous solutions, extracts, &c. I was first struck with its utility during the formation of a solution of opium, about two years since, in order to the preparation of morphia,—and, as the simple means used on this occasion may be substituted for the filter and screw press, in the separation of all the tincture from the dregs of opium in the preparation of tinct. opii, without the presence of that gelatinous precipitate which always accompanies the use of the latter, I will recommend it to those who wish to economise in this and other preparations.

Bind together the long and short legs of two glass syphons with a narrow strip of flannel, at a point from which they will nearly reach to the bottom of the demijohn, or vessel containing the tincture—continue the operation until, upon the introduction of the tubes, the mouth will be obstructed by the flannel,—invert the demijohn and suffer the tincture to filter through the coil of flannel, until all of it has escaped except that which is retained by capillary attraction in the dregs. Then insert a small funnel into the long foot of the syphon, outside of the demijohn, and introduce into the demijohn a quantity of water sufficient to displace the remainder of the tincture.

Thus an amount of tincture can be obtained equal to the spirit used in its preparation. This will be considered quite a desideratum in the preparation of the vinum rad. colchici of the United States Pharmacopœia, where the proportion of root ordered is so great, that nearly all the wine is absorbed; but in adapting the process to this, and some other preparations, I would recommend that the water used in displacing should be charged with about one-fifth its measure of alcohol, in order to prevent it from reviving the mucilage with which the root abounds.

Decoctum Sarsaparillæ Comp. The officinal formula for this preparation is a very imperfect one, as the product is always charged with inert oxidised extractive matter and fecula to such a degree that it is impossible for any one to use it for any length of time, if at all. While conversing upon this subject, about two years since, with one of our most eminent medical men, and comparing the value of the several preparations of sarsaparilla, I was struck with the decided preference he gave to the diet drink, if it could be prepared in the form of ptisan, and determined to apply the principles of the above process to its preparation. My success was far beyond my anticipations, as the result was a concentrated solution of all that is valuable in the ingredients, free from fecula, and the extractive matter is apparently free from the disposition to oxidise, as it could be reduced to a soluble extract. As I communicated my ideas upon this subject to one of our most skilful pharmaceutists at the time, and the experience of two years has confirmed our impressions as to the superiority of this process, I will give it in detail, and refer to an article which has since appeared in the American Journal of Pharmacy, Vol. X. page 10, where a number of experiments are recorded, confirming the above statement.

I am in the habit of using a small tin funnel, the bowl of which does not exceed four inches in diameter, to which is soldered a cylinder or cone of tin, eleven inches long, and five and a half inches wide at the top—into the neck of this is introduced a small willow cap, such as generally cover the

mouths of demijohns, which is sometimes enveloped with a small piece of flannel, to prevent the finer particles from passing through. The ingredients, after having been well bruised, are introduced and kept in their place by a perforated earthen sphere or plate, such as generally accompany infusion pitchers. A quantity of water, equal to the desired product, at about the temperature of 180°, is now passed through the ingredients, and the operation is repeated until it appears saturated; upon which it is set aside, and another portion of hot water used in like manner, until the product is but slightly colored. The displaced liquids are now evaporated in a well tinned copper dish to the quantity indicated.

I have been thus minute in describing the peculiarities of this apparatus, as we have found it well adapted to the preparation of mel scillæ c., syr. sarsæ., syr. rhei et sennæ, syr. rhei, &c. After several years experience in the preparation of the last mentioned syrups, according to the improved formula which I have published in the fifth volume of the Journal of Pharmacy, page 33, I would confidently recommend it as a substitute for that of the Pharmacopœia, as it is not apt to ferment, and the spirit used as a solvent for the rhubarb, &c., is evaporated.

Acidum Hydrocyanicum. The presence of a small quantity of cyanuret of mercury seems to be necessary to the preservation of the acid hydrocyanic of the Pharmacopœia, as I have discovered that when solution of the cyanuret of mercury is super-saturated with sulphuretted hydrogen, it commences to precipitate carbon a few hours after its separation from the sulphuret of mercury. After much experience in its preparation, according to the above process, I have resorted to the process of Gay Lussac, described in the Dublin Pharmacopœia, using half the amount of water ordered, and diluting the product with alcohol, to form a solution equal in strength to the officinal formula. No change has ever been discovered in this preparation.

Maryland Med. and Surg. Journ. Jan., 1840.

ART. VII.—OBSERVATIONS TOWARDS THE STUDY OF TARTARIC ACID. By MM. E. SOUBEIRAN and H. CAPITAINE.

THE curious observation of Dumas and Liebig, of the property possessed by tartar emetic, of losing, when exposed to an elevated temperature, two equivalents of water more than is lost by the other tartrates, gives some importance to experiments made with a view of ascertaining whether the same character appertained to the other tartrates having a similarity in composition. It might be expected to receive from these some light as to the real composition of tartaric acid, which the principal experiments of the two experienced chemists have left totally in doubt.

Tartrate of Iron and Potassa.

Our first attempts were made with the tartrate of iron and potassa, a salt but little understood at present, and whose chemical history is not without interest. We are acquainted with only one analysis of the double tartrate of sesquioxide of iron and potassa, that of Mr. Philips, who found that two atoms of tartaric acid were united with one atom of potassa, and one-half an atom of sesquioxide of iron; and that the oxygen of this latter was to that of the potassa as 1.5 to 1. From our experiments it will be seen that Mr. Philips employed a salt which was not saturated with the sesquioxide of iron.

To prepare the tartrate of iron and potassa, pure bitartrate of potassa, and equally pure hydrated sesquioxide of iron, must be mixed together in water, and digested at the temperature of 50° to 60° c., for twenty-four to thirty-six hours, shaking the mixture occasionally; the excess of hydrate is then to be separated by the filter, and the liquor evaporated to dryness by a low heat. A salt will then be obtained under the form of brilliant scales, of a brown or nearly black color, but of a ruby red, when placed between the eye and the light.

To analyse this salt, after it had been pulverized and dried

at the temperature of 100° c., in the apparatus of M. Liebig, until it ceased to lose weight, it was decomposed by heat, and the potassa estimated in the state of sulphate, and the iron as sesquioxide. For this purpose, a known weight of the salt was carefully calcined, the product was mixed with water, and super-saturated with sulphuric acid; a small excess of carbonate of ammonia was then added, and the liquor filtered and evaporated to obtain the weight of the sulphate of potassa. The proportion of the sesquioxide of iron was found by burning the filter on which it had been collected, washing the ashes with nitric acid, and heating anew to redness. The proportion of the tartaric acid was given by the difference between the weight of the matter employed, and the weights of the potassa and oxide of iron obtained.

I. $3^{gr},355$ of the salt dried at 100° c., gave—		
Sesquioxide of iron,		1.044 or 31.11 p. 100
Sulphate of potassa 1.178, or potassa,		0.637 or 18.98 p. 100
II. $3^{gr},017$ of the same furnished—		
Sesquioxide of iron,		0.920 or 30.49 p. 100
Sulphate of potassa 1.018, or potassa,		0.550 or 18.23 p. 100

These analytic results correspond to the following composition:

1 atom sesquioxide of iron, Fe^2O^3	= 978.41	or	30.29
1 atom potassa, KO,	= 589.92	or	18.26
1 atom tartaric acid, $C^8H^6O^{10}$,	=1661.42	or	51.45
	3229.75		100.00

A composition similar to that of tartar emetic deprived of its water of crystallization; the oxide of antimony being replaced by an oxide of iron.

Our experiments to determine the quantity of water which the tartrate of iron and potassa would lose at a temperature exceeding 100° c., did not give the desired result, but made known to us a remarkable property of this salt. When heated at a temperature not exceeding 130° c., the oxide of iron

is reduced, and water and carbonic acid extricated. If we now endeavor to dissolve the salt in water, a quantity of black ferruginous matter will subside, corresponding in amount to the portion of the salt decomposed.

This easy decomposition of the tartrate of iron and potassa, renders it unsuitable to elucidate the question which we have proposed, but it gives us the key to a fact which is known to those who have managed this salt, and which has hitherto remained unexplained, namely: that when evaporated by a naked fire it often happens that the dried salt refuses to dissolve in water. This results from the elevation of temperature during the drying, being sufficient to produce a partial deoxidisement of the iron.

This ready reduction of the oxide of iron in the tartrate of iron and potassa, appears the more remarkable to us in another experiment, by which we endeavored to produce a double tartrate, in which the oxygen should be in the same quantity in the potassa and in the oxide of iron, or even in a double quantity in this latter. For this purpose we kept at a boiling temperature, in two different mattrasses, the bitartrate of potassa, and the hydrated sesquioxide of iron in the quantities proper to produce these results. At first, the liquid was highly colored on taking up the iron, but all at once it became colorless, and at the same time a deposit, nearly colorless, appeared at the bottom of the vessel. This sediment was tartrate of iron; it resulted from the partial reduction of the sesquioxide of iron by the elements of the tartaric acid. We have produced the same result by boiling a mixture of cream of tartar and tartrate of iron and potassa, and even by boiling a solution of this latter salt, when perfectly pure. It may now be readily seen why we have recommended, in the preparation of this tartrate, that the temperature should be between 50° and 60° c., and how, with an excess of hydrate of the sesquioxide of iron, solutions might be obtained which were not saturated with the iron. This is probably what happened to Mr. Philips; it is what we have observed when this property was not yet known to us in our first experiments,

when each operation gave to us salts of different compositions.

Tartrate of Boron and Potassa.

The tartrate of boron and potassa, (soluble cream of tartar,) when perfectly saturated with boracic acid, has a composition corresponding to that of tartar emetic, and of the tartrate of iron and potassa dried at 100° c. The oxygen of the boracic acid is three times the oxygen of the potassa. But as we can have but little fear that a ready reduction of the boracic acid should confine our experiments, we have examined whether the soluble cream of tartar is affected by heat in the same manner as tartar emetic. We soon ascertained that we could raise the temperature to 285° c. without producing any change. It remained, after this experiment, equally as soluble in water as previous to the action of the heat.

First Experiment.

5^{gr},642 of soluble cream of tartar dried at 100° c., and afterwards heated to 280°, lost—

Water, 0.464 gr., or 8.227 p. 100.

Second Experiment.

3^{gr},535 of another specimen lost—

Water, 0.285 gr., or 8.06 p. 100.

Third Experiment.

2^{gr},872 of a third specimen lost—

Water, 0.230 gr., or 8.008 p. 100.

Admitting that the loss for soluble cream of tartar ought to be, as for tartar emetic, of two equivalents of water, the theoretic loss should be 8.37 p. 100, and the soluble cream of tartar under these circumstances may be fully assimilated with tartar emetic.

We would willingly avail ourselves of other information from analogous tartrates. It would be a matter of curiosity

to ascertain the manner of action of the simple tartrate of antimony. But we have not been able to obtain this salt in a pure state. The processes stated in the works on chemistry, do not conduce to this end. That by which we have succeeded best, is to saturate a solution of tartaric acid with oxide of antimony, to concentrate and precipitate by strong alcohol. But in this case there is certainly a mixture of salts in different states of saturation, and at each operation there was disclosed, by analysis, different quantities of oxide of antimony. We have, it is true, proven that this salt, dried at 100° c., looses an additional quantity of water when raised to the temperature of 250° c.; but, having under trial a mixed product, we deemed it useless to determine the precise quantity lost.

The loss of two atoms of water, which tartar emetic undergoes when heated to 250°, has necessarily led the chemists who have observed this, to the consideration whether it does not contain the acid $C^8H^8O^{10}$. It is desirable to know whence the water, which separates at that temperature, is derived. M. Liebig has given two hypotheses; one, that the water is contained ready formed in the tartaric acid, and is separated at the temperature of 250° c.; in the other, that a part of the oxide of antimony is reduced, forming with the hydrogen of the acid, the water yielded in the experiment. M. Liebig prefers this latter, the partial reduction of the oxide of antimony, and he concludes that we can no longer consider as hypothetical, the true presence of a base contained in the metallic state, in combination with an oxygenated acid.

This partial reduction of the oxide of antimony, in which two-thirds of the antimony enters as a metal into combination, while the other third remains in the state of oxide, does not appear to have great probability. Experiment is not favorable to it; for if we accomplish the decomposition of tartar emetic, or of soluble cream of tartar with care, and so as only to carbonize the organic matter, we find, it is true, in the residue, metallic antimony perhaps, which will not dissolve in weak acids, but in the carbonaceous residue furnished by the

soluble cream of tartar, it is impossible to discover any trace of boron, because this body offers greater obstacles to reduction than the oxide of antimony.

M. Liebig considers the formation of oxalic acid, and hydrated acetic acid, during the decomposition of a tartrate by an excess of caustic potassa, as a conclusive argument against the pre-existence of two atoms of water which separate from the tartar emetic. "If we admit," says M. Liebig, "that tartaric acid contains, already formed, two atoms of water, we are led to admit, likewise, that acetic acid, considered as anhydrous, either contains one atom of water, or is formed by the addition of one atom of water, which passes to a state from which it can no longer be eliminated by bases."

We can see that the difficulty with M. Liebig is to admit that the elements of water, existing as water in tartaric acid, can, in passing to acetic acid, assume another chemical relation. This, however, can no longer appear astonishing amidst so powerful an atomic reaction as that which conduces to the conversion of tartaric into two other different acids.

We would only desire to render it evident that the theoretical reduction of the oxide of antimony, and also of the boracic acid, is not absolutely necessary to the explanation of the facts.

We can in a manner equally simple and easy, represent the composition of tartaric acid, and of the tartrates, by adopting for the equivalent of the acid, the formula $C^8H^4O^8$, and admitting that this acid always unites with four equivalents of base, water, or metallic oxide, two of these equivalents being more strongly retained than the others.

Representing tartaric acid by $C^8H^4O^8$ by T, the tartrates will have the following composition:

$T+2HO+HOHO$=crystallised tartaric acid.
$T+2HO+HOKO$=cream of tartar.
$T+2HO+KOKO$=neutral tartrate of potassa.
$T+2HO+KONaO$=Rochelle salt.
$T+2HO+PbOPbO$=tartrate of lead.

The subsalts known will be the following:

$T+2HO+KOSb^2O^3$=tartar emetic dried at 100° c.
$T+2HO+KOF^2O^3$=tartrate of iron and potassa.
$T+2HO+KOBO^3$=soluble cream of tartar.

When these basic salts, after being dried at 100° c., are heated still higher, the basic water is displaced; but except, as to the excess of base, the composition of the tartrates remains unaltered. We can then explain why the basic tartrates are the only ones which lose two atoms of water by heat; the other not containing the base to be liberated. This theory, any more than the other, cannot be considered as a true expression of the phenomena; it has at least the advantage of satisfying, in a simple manner, the chemical data of experiments which belong to tartaric acid and the tartrates.

In the course of our researches we desired to obtain, by the direct action of cream of tartar on oxide of antimony, the basic salt, which chemists have supposed to exist in the mother waters of tartar emetic. The following are the results:

We kept boiling in a mattrass, for forty hours, one equivalent of pure cream of tartar, (24.64 grammes,) and two equivalents of oxide of antimony (38.24 grammes) in 400 grammes of water. One-half only of the oxide of antimony was dissolved, and the liquid afforded, to the very last, common tartar emetic.

We have not as yet been more successful in producing a tartrate of antimony and potassa not basic. The liquid has always yielded separate crystals of cream of tartar and of tartar emetic. *Journ. de Pharm.*

ART. VIII.—ON THE BORACIC ACID LAGOONS OF TUSCANY. By JOHN BOWRING, LL. D.*

THE borax lagoons of Tuscany are entitled to a detailed description. They are unique in Europe, if not in the world; and their produce is become an article of equal importance to Great Britain as an import, and to Tuscany as an export. They are spread over a surface of about thirty miles, and exhibit, from the distance, columns of vapor, more or less according to the seasons of the year and state of the weather, which rise in large volumes among the recesses of the mountains.

As you approach the lagoons, the earth seems to pour out boiling water, as if from volcanoes of various sizes, in a variety of soil, but principally in chalk and sand. The heat in the immediate adjacency is intolerable, and you are drenched by the vapor, which impregnates the atmosphere with a strong and somewhat sulphurous smell. The whole scene is one of terrible violence and confusion—the noisy outbreak of the boiling element—the rugged and agitated surface—the volumes of vapor—the impregnated atmosphere—the rush of waters—among bleak and solitary mountains.

The ground, which burns and shakes beneath your feet, is covered with beautiful crystallizations of sulphur and other minerals. Its character, beneath the surface, at Mont Cerbole, is that of a black marl streaked with chalk, giving it, at a short distance, the appearance of variegated marble.

Formerly, the place was regarded by the peasants as the entrance to hell, a superstition derived, no doubt, from very ancient times, for the principal of the lagoons, and the neighboring volcano, still bear the name of Mont Cerboli, (Mons Ceberi.) The peasantry never passed by the spot without terror, counting their beads, and praying for the protection of the Virgin.

* From Dr. Bowring's Report on the Statistics of Tuscany.

The borax lagoons have been brought to their present profitable action within a few years. Scattered over an extensive district, they are become the property of an active individual, M. Larderel, to whom they are a source of wealth, more valuable perhaps, and certainly less capricious, than any mine of silver that Mexico or Peru possesses. The process of manufacture is simple, and is effected by those instruments which the localities themselves present. The soffioni, or vapors, break violently forth in different parts of the mountain recesses. They only produce boracic acid when they burst with a fierce explosion. In these spots artificial lagoons are formed by the introduction of the mountain streams. The hot vapor keeps the water perpetually in boiling ebullition ; and after it has received its impregnation during twenty-four hours at the most elevated lagoon, the contents are allowed to descend to the second lagoon, where a second impregnation takes place, and then to a third, and so forth, till it reaches the lowest receptacle ; and having thus passed through from six to eight lagoons, it has gathered one-half per cent. of the boracic acid. It is then transferred to the reservoirs, from whence, after a few hours rest, it is conveyed to the evaporating pans, where the hot vapor concentrates the strength of the acid by passing under shallow leaden vessels from the boiling fountains above, which is quite at a heat of 80°R.,* and is discharged at a heat of 60°.† There are from ten to twenty pans, in each of which the concentration becomes greater at every descent, till it passes to the crystallizing vessels, from whence it is carried to the drying rooms, where, after two or three hours, it becomes ready to be packed for exportation.

The number of establishments is nine.‡ The whole amount produced varies from 7000 to 8000 pounds (of 12 ounces) per day. The produce does not appear susceptible of much extension, as the whole of the water is turned to account ; the

*The boiling point. †167° Farenheit.

‡The principal are Monte Cerboli, Monte Rotondo, Susso, Serazzano, and Castelnuovo.

atmosphere has, however, some influence on the result. In bright clear weather, whether in winter or summer, the vapors are less dense, but the deposition of boracic acid in the lagoons is greater. Increased vapors indicate unfavorable change of weather, and the lagoons are infallible barometers to the neighborhood, even at a great distance, serving to regulate the proceedings of the peasantry in their agriculture pursuits.

It has been long supposed that the boracic acid was not to be found in the vapors of the lagoons; and when it is seen how small the proportion of the acid must originally be, it will not be wondered at, that its presence should have escaped detection. In the lowest of the lagoons, after five, six, and in some cases a greater number of impregnations, the quantity of boracic acid given out does not exceed one-half per cent.; thus, if the produce be estimated at 7500 pounds per day, the quantity of saturated water daily discharged is a million and a half of Tuscan pounds, or five hundred tons English.

The lagoons are ordinarily excavated by the mountaineers of Lombardy, who emigrate into Tuscany during the winter season when their native Appenines are covered with snow. They gain about one Tuscan lira per day. But the works are conducted, when in operation, by natives, all of whom are married, and who occupy houses attached to the evaporating pans. They wear a common uniform, and their health is generally good.

A great improvement in the cultivation, and a great increase in the value of the neighboring soil has naturally followed the introduction of the manufacture of the boracic acid. A rise of wages has accompanied the new demand for labor; much land has been brought into cultivation by new directions given to the streams of smaller rivers. Before the boracic acid lakes were turned to profitable account, their fetid smell—their frightful appearance, agitating the earth around them by the ceaseless explosions of boiling water, and not less the terrors which superstition invested them,* made the lagoons them-

* So unwilling were the peasants to settle in these districts, that very extraordinary encouragements were held out to them. In the commune

selves to be regarded as a public nuisance, and gave to the surrounding country a character which alienated all attempts at improvement.

Nor were the lagoons without real and positive dangers, for the loss of life was certain where a man or beast had the misfortune to fall into any of these boiling baths. Cases frequently occurred in which cattle perished; and one chemist of considerable eminence, met with a horrible death by being precipitated into one of the lagoons. Legs were not unfrequently lost by a false step into the smaller pits, (putezzi,) where, before the foot could be withdrawn the flesh would be separated from the bone.

That these lagoons, now a source of immense revenue, should have remained for ages unproductive; that they should have been so frequently visited by scientific men, to none of whom (for ages at least) did the thought occur, that they contained in them mines of wealth, is a curious phenomenon; nor is it less remarkable, that it was left for a man, whose name and occupation are wholly disassociated from science, to convert these fugitive vapors into substantial wealth.

Though to the present proprietor (the Chevalier Larderel*) the merit attaches of having given to the boracic lagoons the

of Monte Cerboli any inhabitant of the town may sow and reap whatever he pleases, without requiring the consent of the owner of the soil; so it frequently happens that small tracts are cultivated which are particularly favored by water or other advantages, and all the surrounding land left untouched. As the inhabitants have the primary right, the landlord generally abandons his property to the chance cultivation of the peasant who leaves fallow nine-tenths of the land. In the district of Riparbella the landlords and cultivators have come to a sensible agreement by apportioning the lands in equal moieties.

Many mineral waters are in the neighborhood of the lagoons, some of which possess medical virtues, and are visited by the Tuscans in the bathing season.

* While these sheets have been passing through the press, the Grand Duke of Tuscany has conferred on M. Larderel the title of Count de Pomerance.

great importance they now possess, a succession of adventurers had made many experiments, and had produced a considerable quantity of boracic acid, but at a cost (from the expenditure of combustible) which left little profit.* The small value which was attached to them may be seen in the fact, that the largest and most productive district of the lagoons, that of Monte Cerboli, was offered in perpetuity, so lately as 1818, at an annual ground rent of £6. 13*s.* 4*d.* per annum, though it now produces several thousand pounds sterling. The immense increase in their value arose from the simplest of improvements, the abandonment of the use of charcoal, and the application of the heat of the lagoons, or soffioni to the evaporation of their own waters. Improvements, however, and very important ones, particularly by subjecting the waters to a succession of impregnations, had been gradually introduced by a Signor Ciaschi, and the importation of boracic acid from Tuscany into France, before 1817, had been between 7000 and 8000 pounds, of a quality gradually increasing in purity; but Ciaschi perished miserably, in consequence of falling into one of the lagoons which he himself had excavated, leaving his family in a state of extreme poverty. His death (which happened in 1816) naturally threw a damp upon adventure. The experiments were resumed in the following year, and in the midst of violent claims and controversies, M. Larderel has become the monopolist of the boracic productions of Tuscany.

With the increased production of boracic acid, has arisen an increased demand, growing out of the more extensive applications of it to manufacturing purposes. In about four years, the quantity has been quadrupled by superior modes of extraction, and by greater care employed in collecting the boracic vapor. In 1833, about 650,000 Tuscan pounds were obtained. In 1836, two millions and a half.

* Hoefer first announced the presence of boracic acid in the Maremman districts, and Mascagni in his commentaries suggests the manufacture of borax as an object worthy of attention. Professor Gazzeri, in 1807, made experiments, which, however, seemed to show the quantity of boracic acid contained in the waters was too small to promise much success.

But it appears to me that the powers and riches of these extraordinary districts remain yet to be fully developed. They exhibit a great number of mighty steam engines, furnished by nature at no cost, and applicable to an infinite variety of objects. In the progress of time this vast machinery of heat and force will probably become the moving central point of extensive manufacturing establishments. The steam, which has been so ingeniously applied to the concentration and evaporation of the boracic acid, will probably hereafter, instead of wasting itself in the air, be employed to move huge engines, which will be directed to the infinite variety of productions which engage the attention of laboring and intelligent artizans; and thus, in the course of time, there can be little doubt that these lagoons, which were fled from as objects of danger and terror by uninstructed man, will gather round them a large and intelligent population, and become sources of prosperity to innumerable individuals, through countless generations. *Edin. New Phil. Journ.*

ART. IX.—THEORY OF THE AMIDETS. By M. J. Dumas.

The analysis of oxamide having disclosed that this substance contains—

2	atoms of	- -	Carbon,
2	"	- - -	Oxygen,
1	"	- - -	Nitrogen,
2	"	- - -	Hydrogen,

and the examination of these reactions having proven that it is changed into oxalate of ammonia, or into oxalic acid and ammonia, under the operation of a large number of influences, there results from hence a theory which may readily be applied to many analogous compounds.

It may be conceived that oxamide may be represented by

two binary compounds, the oxide of carbon, and a peculiar nitruret of hydrogen,* containing less hydrogen than ammonia, and which has not as yet been obtained in a separate state. Oxamide then may be written with this formula—

$$C^2O^2+NH^2.$$

Of the two compounds it is necessary to inquire which plays the negative part, and we come easily to the result by the following considerations: It is known, that in general when any body decomposes water, it separates the hydrogen by means of its negative element, and the oxygen by its positive element. But since oxamide in passing to the state of oxalate of ammonia, decomposes water, it would appear that the nitruret of hydrogen, which separates the hydrogen should be the negative element, and the oxide of carbon which unites with the oxygen would play the positive part in the compound.

The reasoning which we have set forth with regard to oxamide, may be applied to urea, which, in fact, contains—

2	atoms of - -	Carbon,
2	" - - -	Oxygen,
2	" - - -	Nitrogen,
4	" - - -	Hydrogen.

It acts in every respect like oxamide, and is changed into carbonate of ammonia, or rather into carbonic acid and ammonia, by the decomposition of water under the operation of numerous influences. Its formula, decomposed according to these considerations, would become—

$$C^2O^2+N^2H^4.$$

Here again appears the oxide of carbon and the nitruret of hydrogen already recognised in the oxamide. Here likewise, for the same considerations, it is the oxide of carbon which

* To this hypothetical compound the name amidogene has been applied.

plays the positive and the nitruret of hydrogen which performs the negative part in the compound.

We may then admit, as almost an expression of fact, the principles from which are derived the explanation of the characters of oxamide and urea. But the attentive examination of these characters will lead to a more elevated view, which gives to the theory of the amidets a very great amount of interest.

Admit, for a moment, that ammonia, by reason of its hydrogenous nature, may act as a hydrobase, in the same manner as of an acid in the hydracids, and that it may loose the whole or part of its hydrogen by forming water, it then becomes easy to conceive how, by the action of heat, the oxalate of ammonia is changed into oxamide; this reaction bearing a strong resemblance to that by which is explained the conversion of a hydrochlorate into a chloride. In fact we have—

$$C^2O^3+NH^3=C^2O^2+NH^2+HO.$$

It is likewise easy to comprehend the reproduction of oxalate of ammonia, or of oxalic acid and ammonia from oxamide, when examined from the same point of view. For under the influence of water only, with an elevated temperature, oxamide is converted into oxalate of ammonia.

The acids determine the formation of ammonia and set oxalic acid free.

The bases produce the same reaction, with a disengagement of ammonia.

Thus, oxamide acts as a chloride, which, containing neither acid or metallic base, nevertheless gives rise to hydrochloric acid and an oxide under similar influences.

It therefore appears rational to consider oxamide as a body analogous to the chlorides in which the oxide of carbon plays the part of a metal, and the nitruret of hydrogen the part of chlorine. By calling this nitruret of hydrogen by the name of *amide*, we will have under this view—

Amidet of oxide of carbon, or oxamide, $=C^2O^2+NH^2$.
Bi-amidet of oxide of carbon, or urea, $=C^2O^2+N^2H^4$.

If this new view were confined merely to the expressing in a more simple manner the facts which we have pointed out above, it would scarcely require any further attention; but if it leads us to forsee the better, to classify the better, to explain the better, numerous reactions, it then becomes necessary to allot it a place among the provisional theories of organic chemistry. To verify the exactness of the theory, it is proper to examine the facts concerning the negative, and the positive bodies which we suppose to exist in oxamide, as well as this substance itself, and to see not only whether any thing opposes the resemblance, but also if the facts could be foretold by an incontestible analogy.

We remark at once, that if ammonia acts similarly to an hydracid, although in an inverse sense, it should act, like them, with regard to the metals, since on loosing hydrogen, the remaining elements form an electro-negative body. Thus, by heating potassium or sodium, for example, with ammonia, it should form amidets of these metals, of which we could predict the composition and characteristic properties. These amidets should be produced according to the following formula:

$$N^2H^6+K=H^2+K,\ N^2H^4.$$
$$N^2H^6+Na=H^2+Na,\ N^2H^4.$$

In other words, by acting on ammonia, the potassium and the sodium should furnish two volumes of hydrogen in decomposing four volumes of ammonia. Thus the above metals, by acting on ammonia, should liberate the same quantity of hydrogen as if they acted on water. This is precisely the result at which MM. Gay Lussac and Thenard arrived in their numerous experiments on this subject.

But they did not always observe a disappearance of ammonia equal to a volume double to that of the hydrogen formed. Their experiments never gave for four volumes of hydrogen disengaged, more than seven volumes of ammonia decomposed. It is therefore necessary to recur to new trials to verify it under this point of view.

Besides, as that which we now regard as an amidet of potassium is changed by heat into a nitruret of potassium and ammonia, and as the nitruret itself is changed into ammonia and potassium by the action of water, it is proper to examine whether these two facts can be explained. We have, in fact,—

$$K^3, N^3H^6 = K^3N + N^2H^6.$$
$$K^3, N + H^3O^3 = K^3O^3 + NH^3.$$

The first formula represents the action of heat upon the amidet of potassium; the second that of water on the nitruret, which thereby results. The first of these formulæ shows how difficult it is to form the amidet, without producing some nitruret; and it explains to us the difference cited above, between the formulæ and the experiments of MM. Gay Lussac and Thenard.

It is possible that the substances, at present called chloride of nitrogen, iodide of nitrogen, &c., may be only chloride and iodide of amide, &c.

The oxide of carbon may in its turn be considered as a radical, as I have proposed long since. On this supposition, the chloroxi-carbonic acid will be a chloride of oxide of carbon, and carbonic and oxalic acid will be the oxides.

The formulæ of oxalic and carbonic acids may be written in the following form:

Oxide of Carbon,	CO.
Oxalic Acid,	$2CO + O$.
Carbonic Acid,	$CO + O$.

That of chloroxi-carbonic acid will be $CO + Cl$.

To return to oxamide and urea, we now can better understand their nature; for urea becomes analogous to chloroxi-carbonic acid, and oxamide to a combination $C^2O^2 + Cl$. In fact, the action of these different compounds on water produced identical results.

$$(CO+Cl)+HO=ClH+(CO+O.)$$
$$(C^2O^2+Cl)+HO=ClH+(C^2O^2+O.)$$
$$(C^2O^2+NH^2)+HO=NH^3+(C^2O^2+O.)$$
$$(C^2O^2+N^2H^4)+H^2O^2=N^2H^6+(C^2O^2+O^2.)$$

Finally, in oxamide and in urea do we find characters which belong to the chlorides, that is to say, the power of combining with compounds of the same order as themselves, and of a neutral nature. To be convinced that it is so, it suffices to examine the following formula:

$$\text{Oxamethane, } \underset{\text{Oxamide.}}{(C^2O^2,\ NH^2)}+\underset{\text{Oxalic Ether.}}{(C^2O^3H^4C^4,\ HO.)}$$

$$\text{Urethane, } \underset{\text{Urea.}}{(C^2O^2,\ N^2H^4)}+\underset{\text{Carbonic Ether.}}{(C^2O^4,\ H^8C^8,\ H^2O^2.)}$$

It is evident, according to these formulæ, these combinations correspond to those which common salt forms with the sugar of raisins or diabetes.

Thus, without pretending that these different examples are interpreted in a manner conformable to truth, we may say that if we admit an electro-negative body, NH^2, in the amidets, we attain to an explanation of a great number of facts, without going out of the ordinary circle of chemical conceptions, and that with a little reflection we may be led to foresee the existence of a great number of new combinations.

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ART. X.—ON THE STRONG DECOCTION OF ZITTMAN.

By A. Wiggers.

This remedy has been several times, as is known, the object of chemical investigation; sometimes mercury has been detected, and at others has not been found in it. The insolubility of the mercurial preparations employed in its preparation, (calomel and cinnabar,) appear to have rendered this last result most probable. Their addition has even been regarded as absurd, and they have accordingly been excluded from the preparation.

To determine whether this decoction does or does not contain mercury in solution, M. Wiggers has made the following experiment:

He prepared it according to the last Prussian Pharmacopœia, which is generally followed in Germany in obtaining this medicine. The ebullition was accomplished in a glass matrass. By filtering the liquid through a triple filter of thick paper, he obtained it so clear that it was not possible to admit the presence of any mercurial combination by means of mechanical suspension. He mixed four pounds of this decoction with a proportionate quantity of nitric acid, then he boiled the mixture until reduced to near two ounces; he continued the ebullition with the residue by frequently adding nitric acid, until the acid exhibited no more action and he had destroyed, as far as possible, the organic matters. After the evaporation had been pushed as far as could be done, he endeavored, by the reiterated addition of hydrochloric acid, and elevation of temperature, to decompose and drive off all the nitric acid. He finally diluted the mass with water, filtered and saturated it with sulphuretted hydrogen. He thus obtained a light, brownish-yellow precipitate. When this precipitate was collected and washed, boiling nitric acid appeared to have little action upon it, but it was immediately dissolved by the addition of a small quantity of hydrochloric acid, by allowing the separation of a little sulphur. All the

nitric acid contained in the solution was dissipated and destroyed by ebullition and repeated additions of hydrochloric acid. The liquid thus obtained was perfectly clear and colorless; evaporated to a small residuum, and chloride of tin being added, it gave a grayish-black cloud, which was condensed by heat and the addition of a little alcohol into globules of metallic mercury, so easy of recognition, that doubt no longer remained with respect to the presence of mercury in solution in this decoction. But the quantity was too small to be able to appreciate it correctly. M. Wiggers estimates it approximatively at one-half a millogramme to the four pounds of decoction. The quantity of mercurial combinations which are active, when this decoction is employed, is certainly greater, not, however, in a state of solution, but in that of simple suspension, as it is directed not to filter it, but to simply pour it off; in fact, the little bag, in which the calomel and cinnabar ought to be suspended in the liquid during ebullition, allows a large quantity of these bodies to escape, which finally pass through the linen serving as a filter.

The small quantity of mercury in solution does not permit of determining exactly under what form it exists. The cinnabar, a body completely insoluble in water, and which does not undergo any decomposition under the circumstances which attend the preparation of this decoction, appears not to be the cause of the solution of the mercury; but we may suppose, according to M. Wiggers, that the calomel is decomposed by a catalytic action into metallic mercury and corrosive sublimate, a decomposition which is brought about in it, as is known, by many bodies. In this case the mercury may be found dissolved in the decoction, partly in the state of sublimate, and partly in the metallic state, under the form of gas; and M. Wiggers believes this proposition more likely than the opinion of Catel, who thinks that the mercury becomes oxydised, and is dissolved under the form of the acid sulphate of the deutoxide of mercury, by means of the sulphuric acid of the alum which is added.

After having thus proved, beyond doubt, the actual solu-

tion of mercury in Zittman's decoction, M. Wiggers re-renews the judicious proposition of Catel, of not preparing this medicine in any metallic vessel, of tin, copper, brass, or iron, as is often done, but to employ for this purpose glass, porcelain, or stone-ware, otherwise the mercury would precipitate on the metallic vessel. A. G. V.

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ART. XI.—ON THE EMPLOYMENT OF A NEW VEGETABLE, MONESIA, IN MEDICINE. By Dr. G. Martin St. Ange.

A vegetable substance, called *monesia*, has lately been imported from South America, in the form of hard thick cakes, weighing about five hundred grammes, (8215 grains.) These loaves, which are flattened, and have paper, of a yellow color, adhering to them, are composed of the extract, prepared in the country, from the bark of a tree, whose botanical name is not known. M. Bernard Derosne, the druggist who introduced it, informs me that some travellers call the monesia bark *goharem;* and others, *buranhem.* But what is of more importance, is, that the naturalists who have examined it, think that the tree which furnishes it, is a chrysophyllum.

The extract is of a deep brown, and very friable; when broken, it looks like a well roasted cocoa-nut. It is entirely soluble in water; and its taste, which is at first sugary, like liquorice, soon becomes astringent, and leaves behind a well marked and lasting acid taste, which is particularly felt in the tonsils.

The bark of the monesia is smooth and grayish, like that of the plane tree, with this difference, however, that it is much thicker; that its fracture is imbricated, and that its sweet taste forms a strong contrast with the bitterness of the thin laminæ which are detached from the plane.

The chemical analysis of the bark of the monesia, and of

the imported extract, according to MM. Bernard Derosne and O. Henry, has demonstrated the presence of the following soluble principles:—1, chlorophylle; 2, vegetable wax; 3, a fatty and crystallizable matter; 4, glycyrrhizine; 5, an acrid and somewhat bitter substance; 6, a little tannin; 7, an unexamined organic acid; 8, a red coloring matter, resembling that of cinchona; 9, phosphates of lime, with organic acids.

The pharmaceutical preparations which have been made with this substance are—1, an aqueous extract; 2, a syrup, containing thirty centigrammes, (5½ grains) in the ounce; 3, a hydro-alcoholic tincture, containing two grammes (37 grains) per ounce; 4, chocolate, containing thirty centigrammes (5½ grains) in each cake, weighing three decagrammes (7 drachms, 49 grains;) 5, an ointment, containing an eighth part of its weight of extract; 6, monesine, being the acrid substance mentioned in the analysis.

The extract contains about eight per cent. of glycyrrhizine, and twenty per cent. of acrid matter.

The following accounts of monesia are already in existence:

1. A manuscript memoir, which is in the hands of the commissioners appointed by the Academy of Medicine. 2. A synoptical table, giving the analysis, some pharmaceutical preparations, and the medicinal preparations, of monesia. 3. A very minute summary of these two papers, entitled, "Account of Monesia." 4. An article inserted in the *Bulletin Thérapeutique.*

I will now give a succinct account of the facts which have been published, before mentioning the results which I have obtained, myself.

The medical cases in the synoptic table have been drawn up by several physicians in Paris; they give the nature of the disease, the sex, the profession, the age, and the constitution of the patient; the mode of treatment, and duration of the disease, the termination; and, lastly, the remarks suggested by each method of treatment.

M. Alquié, professor of internal pathology at the Val-de-Grâce, found—

1. That of forty-two soldiers attacked with diarrhœa, of different degrees of severity; thirty-six were cured in twelve days; twenty-four by the extract of monesia, given in pills, in the dose of from eighty centigrammes, to a gramme ($14\frac{1}{2}$ to $18\frac{1}{2}$ grains) a day; and twelve by the tincture, administered as a clyster, in the dose of eight grammes ($147\frac{1}{2}$ grains) in two hundred and fifty grammes ($4607\frac{1}{2}$ grains) of bran water.

2. That in two cases of menorrhagia, the extract and the tincture of monesia, given internally, soon calmed the pain, and stopped the uterine discharge.

3. That in four women attacked with profuse leucorrhœa, the extract of monesia given internally, and the diluted tincture injected into the vagina, were beneficial.

4. That in two cases of hæmoptysis, where bleeding, ligature of the limbs, and ordinary astringents, had been employed without advantage, the extract of monesia succeeded completely; and that several chronic cases of bronchorrhœa were benefited by the syrup of monesia, which was sometimes combined with opium.

M. Baron cities—1. A very remarkable case of chronic inflammation of the vagina, of a syphilitic kind. No advantage had attended the previous use of baths, local bleedings, emollient and astringent injections, the nitrate of silver; a year later, the diluted supernitrate of mercury, sulphurous baths, leeches, and the repeated application of blisters and sinapisms, were equally useless. In spite of these remedies, the discharge from the vagina became more abundant. Injections were then used containing thirty grammes (552 grains and $\frac{9}{10}$ths) of the extract of monesia in a hundred and fifty grammes ($2764\frac{1}{2}$ grains) of water. In eight days the discharge was much diminished, and in three weeks the patient was cured. The discharge returned in a month, but again yielded to the same injections.

2. A case of leucorrhœa. The discharge was copious, of a yellowish-white color, and accompanied with pains in the groins and lumbar regions; baths, leeches, and injections of

mallow water and laudanum, had produced no benefit. Injections of monesia, in the proportion of thirty grammes (562 grains and $\frac{9}{11}$ths) to a hundred grammes (3317½ grains) of water, were employed once a day, and the patient was cured in a fortnight.

3. Several cases of diarrhœa, which resisted the means generally used, were cured by the extract of monesia given internally, and clysters containing the tincture, in different proportions.

M. Buchez has employed the extract of monesia, and has remarked, that it delayed the progress of caries in the teeth, and that when combined with opium it often soothed the pain more effectually than the opium alone. He recommends the employment of the tincture to keep the gums in a healthy state.

M. Daynac speaks of the good effects he has obtained from the preparations of monesia (the syrup, lozenges, and paste) in several cases of the chronic catarrh of the old, in dyspeptic persons, and in the third stage of phthisis. He also cites remarkable cases of scrofulous engorgement, much benefited by the use of the tincture of monesia, in the dose of eight grammes (147½ grains) daily, continued for a greater or less time. Lastly, the extract of monesia in pills, in the dose of sixty to ninety centigrammes (11 to 16½ grains,) has been very serviceable in uterine discharges.

M. Laurand speaks of a well marked case of scurvy which he cured with monesia. The patient had had frequent epistaxis, which had several times required the nostrils to be plugged. He was made to inspire acidulated water by the nostrils, containing thirty grammes (552 grains and $\frac{9}{10}$ths) of the tincture to a pound of water. This stopped the hæmorrhage; but when the same thing had been done with acidulated water not containing monesia, it had not succeeded. The patient also took from a gramme to a gramme and a half (18½ to 27¾ grains) internally, every day. The same physician has ascertained the efficacy of monesia in a great variety of circumstances, particularly in gangrenous eschars on the sacrum.

M. Manec has employed the different preparations of monesia with success:—

1. In a man who, for six years, had had a large herpiginous ulcer in the bend of the groin, which had resisted every kind of treatment, and which rapidly improved under the use of monesia ointment.

2. In a great number of aged women, laboring under diarrhœa, and in persons affected with chronic bronchitis.

M. Monod has furnished some very interesting cases; some, of ulcers of the nose, and others of affections of the intestinal canal.—The ulcers were dressed with the powdered extract, and cured in a few days. In the other cases, the extract given in pills to the amount of sixty to a hundred and twenty centigrammes (11 to 22 grains) daily, was perfectly successful.

M. Payen, who has employed monesia in a great number of cases, has seen a patient in whom leucorrhœa was considerably increased by this medicine, administered two different times; the monesia was then tried as an injection, and the discharge, which had hitherto resisted every remedy, disappeared, and did not return. The same practitioner cites two cases of uterine hæmorrhage, where the patients were obliged to keep their bed for a fortnight at each menstrual period, and in which the monesia brought back the discharge to its healthy standard. Lastly, M. Payen has succeeded in cicatrizing an ulcer in the lower jaw, which for ten months had resisted every kind of treatment, both internal and external; and in healing ulcerated chilblains, by means of the ointment and the powdered extract of monesia.

Thus we see that monesia has been employed both externally and internally. It has been frequently administered during the chronic stage of bronchitis, usually alone, but sometimes combined with opium, and in the greatest number of cases it has seemed to act advantageously upon the disease, the expectoration and respiration being rendered more easy.

In many cases where pulmonary hæmorrhage was prolonged, having resisted various and generally efficacious remedies, the extract of monesia has stopped the spitting of blood.

In weakness of the stomach, monesia has a very favorable influence on digestion, and secondarily on nutrition. This medicine has also been very beneficial in chronic enteritis; it has chiefly succeeded against diarrhœa, from whatever cause it arose.

The efficacy of monesia taken internally has been less marked in leucorrhœa than in diarrhœa; yet it has been useful in the majority of patients who have taken it; but injections have been more advantageous.

In every case of uterine hæmorrhage where monesia has been given, it has succeeded in moderating and suppressing the discharge more readily than the other remedies which had been previously used.

Monesia has also been of great advantage in scorbutic and scrofulous affections, and has always benefited ulcers of a bad character, whether the ointment, or the pure extract powdered, or the acrid substance contained in it, has been employed.

Such is the compendium of the cases hitherto published, with the exception of four by M. Forget, which are the basis of the article that he has published in the *Bulletin Thérapeutique*, and which, as he says himself, neither tell for nor against monesia.

We may say, therefore, generally, that monesia shows its maximum of power in diseases of the digestive organs, in hæmoptysis, uterine hæmorrhage, and ulcers of the skin, or of the mucous membranes, at their origin. A remarkable point in this remedy is, that although it is gifted with energetic powers, and has acted upon the tonsils or upon ulcerations as an active stimulant, it has never irritated the stomach as tonics, properly so called, often do. In order to form a due estimate of its relative activity, we must not forget that it has always been employed after the exhibition of other remedies.

I now come to my own cases, the general results of which may be stated as follows:—

Monesia, when exhibited internally, in the dose of from 75 to 125 centigrammes (14 to 23 grains) of the extract daily, for eight or ten days, whether in the form of pill, tincture, or

syrup, has an immediate effect upon the digestive passages, and quickens the action of the stomach in a very remarkable manner. If the dose of the remedy is pushed to four grammes (74 grains) of the extract, daily, for fifteen or twenty days, the appetite increases, but the patients sometimes experience a feeling of heat in the epigastrium:* tenesmus and obstinate constipation may also come on; hence its action upon the digestive tube should be moderated by diminishing the dose according to the effect produced, and administering emollient or laxative clysters, as may be required.

Monesia ointment may be employed externally upon sores, in every case, but with more or less success, according to circumstances: thus I have seen it succeed in large and excessively painful ulcers, arising from the action of blisters, in sores produced by burns, in varicose ulcers and old wounds; in a word, whenever the sore is painful, and depends on a merely local affection. When this is not the case, and the ulcer is kept up by syphilis, scrofula, scurvy, or cancer, it is impossible to effect a permanent cure by merely applying the monesia ointment, washing the sores with the tincture, or sprinkling them with the extract or acrid principle contained in it. Yet, by employing these different preparations in a proper manner, we may hope to modify the sores, and even to cure them for a time. Generally speaking, the ointment, when applied to a sore, calms the local pain; the tincture thus used, produces a sensation of heat, which ceases immediately; the powdered extract more or less excites the sore, and the acrid principle in powder, when well prepared, has a special activity greater than caustic: hence it is a powerful remedy against fungous or atonic ulcers of a bad appearance; but as soon as these sores become painful, and especially when they are covered with a whitish pellicle, the use of the acrid principle should be discontinued; for it is usually this pellicle which, by preserving the surface of the sore from contact with the

* Showing that it *does* irritate the stomach, contrary to the assertion made a few lines before.—*Translator*.

air, and perhaps by becoming partly organized, produces cicatrization.

I have said expressly, that it is impossible to obtain a lasting cure of syphilitic or cancerous sores by the mere external use of this remedy; in such cases, therefore, we must have recourse to a specific treatment capable of acting on the system. I have found, that in order to effect the cure of scrofulous ulcers, the monesia must be employed internally, for five-and-twenty or forty days, and even longer, according to the case; and this in large doses, such as four or five grammes (74 or 92 grains) of the extract daily, in the form of pill, tincture, or syrup. In this way I have succeeded in curing or benefiting several scrofulous patients. Here follow two remarkable examples:—

Case 1.—A young man of 17, a printer, born of very healthy parents, came to see me in February, 1839, to have the little finger of his left hand amputated. On looking at the diseased parts, I saw it was a scrofulous affection of only eight months' standing. The first phalanx was much swelled, the soft parts covering it were livid, and there were three fistulous openings in the skin; two corresponding to the dorsal part of the phalanx, and the third to its palmar surface. They were surrounded with callous vegetations of a brownish color, and communicated with one another by means of subcutaneous fistulous passages. By introducing a blunt probe into the sores, it was easy to reach the bone of the finger, and to ascertain the detachment of the skin and the caries of a portion of the phalanx. The suppuration was serous, yellowish, of a faint odor, and contained some flakes of a substance which seemed carious. Strong pressure of the diseased tissues occasioned hardly any pain. On the back of the hand and left elbow, there was also a swelling of the skin and of the subjacent parts, looking like the little finger. The swelling and livid patch extended from the elbow* to the inside of the bend of the arm; its cen-

* The original here has *cou*, but this must be a misprint for *coude*.—*Translator*.

tre was ulcerated, and covered with a thick crust, which, according to the patient's report, was renewed every two or three days.

I began by sprinkling the acrid principle of monesia on the small sores of the finger. After some days' dressing, the swelling of the soft parts began to diminish, and at the end of about twenty days, the fistulous openings entirely closed. The diseased tissues at the back of the hand then ulcerated, and the acrid principle being employed as above mentioned, in a few days a cure was effected. There remained only the sore upon the elbow, which had been purposely dressed with cerate. It continued to suppurate, and to be covered from time to time with a fresh crust.

The patient was in this state when I presented him to Dr. Bailly, who had been commissioned by the Academy to report on the effects of monesia. The affection appeared to him to be evidently scrofulous, and the result obtained to be very satisfactory. The disease, however, soon reappeared; the fistula of the finger began to suppurate again; there was swelling and livid redness of the soft parts, with engorgement and induration of the back of the hand; the sore on the elbow became larger and deeper. The patient now entered the hospital of St. Louis, where he had internal medicines as well as fumigations, sulphurous baths, &c. In a month, he came out, with the diseased parts in a worse state than ever. I now prescribed the internal use of monesia—namely, twelve pills, each containing 20 centigrammes ($3\frac{1}{2}$ grains,) and two spoonfuls of the tincture. The sores were dressed with common cerate. Under this treatment, the patient was cured in thirty-five days. Nevertheless he continued to take five pills a-day, till the fiftieth day.

Since July, the diseased parts have been constantly improving, and a lasting cure may be hoped for. It is right to state, that in this case the preparations of monesia did not cause tenesmus or constipation, although the patient did not employ any purgative; the only thing he complained of, was too much appetite.

Case 2. M. ——, æt. 40, who had always enjoyed perfect health, came to France two years ago, and perceived, in the month of April, 1839, that he had an indolent tumor in the left inguinal region. Several physicians of the capital were consulted, and they ascertained that it was a swelling of one of the superficial lymphatic glands, situated in the bend of the groin. On the 21st of the same month, I was also consulted by the patient. The diagnosis was not difficult, but the point was to know how the tumor would turn out. My prognosis was favorable, like that of all the other physicians, excepting M. Lisfranc, who thought that the swelling of the gland, though slight, depended on a general affection. On the 2d of May the groin continued to swell, and from that time all the other glands of that part, as well as of the left iliac fossa, swelled considerably; and this was soon the case with those of the opposite side. Twenty pages would scarcely suffice to tell all that was prescribed by the physicians, and patiently submitted to by M. ——. No remedy was of any use, except for a short time ; and I therefore proposed monesia, in the dose of one hundred and fifty centigrammes (twenty-eight grains) of the extract a-day. The patient at this time was extremely weak, ate but little, and was feverish every day. In a week, digestion had improved; there was a sensible increase of strength, and no fever. The sores were dressed with the monesia ointment. In consequence of these results, I tried to augment the dose of the medicine, and, besides the extract, the patient took two spoonfuls of the tincture, and from four to six of syrup in an infusion of hops. As to the sores, which obviously grew better, the same dressing was continued morning and evening, and every thing promised a speedy cure, when constipation and a most painful tenesmus came on, which obliged us to suspend the treatment. In a few days the sores became larger and larger, fungous, and of a bad appearance.

The dressing was then changed—extract of monesia in powder and the tincture being employed; but these remedies were almost as useless as a host of others which were successively

tried. It then seemed clear to me that the internal use of monesia had alone produced the improvement, and its use was accordingly resumed, taking care to make laxatives a part of the treatment. For this purpose the patient had two glasses of Enghien water every morning, and an emollient clyster. In a fortnight, the good effects of the monesia were again perceived; and this was more to be attributed to its internal use, as the dressing had been performed with simple cerate.

At present, the swelled glands of the groin are softening and disappearing, without any suppuration. Those of the iliac fossa are diminishing in size; the sores have cicatrized, and the disease, far from attacking the lymphatic glands of the other parts of the body, as is commonly the case, is localized, and is much lessened. The patient eats with a good appetite, sleeps well, and takes exercise three hours a day, which makes us hope for a fortunate termination of the disease.

Another result which I have obtained from the use of monesia, and which has been observed by other practitioners likewise, is its action upon the uterus in cases of menorrhagia. I will give two instances :

Case 3.—Madame ——, of a plethoric constitution, was attacked, after the catamenial period, with a flooding, which obliged her to keep her bed, and seek for advice. After having employed cold drinks, ligatures on the limbs, cupping-glasses, and other revulsives, without success, I made the patient take five monesia pills, each containing twenty centigrammes (three grains and three-fifths.) The next morning she was very weak; the skin burning, the pulse scarcely perceptible, the face pale, and the eyes sunken. She had shivering fits from time to time, a sensation of weight in the loins, transient colic pains, and headach, with sleepiness; and what was more, the hæmorrhage did not diminish. I then prescribed twelve pills of extract of monesia to be taken every hour. The discharge stopped the same day and never re turned.

Case 4.—Madame ——, aged 20, who had been married

six months, had frequent pains in the loins; and in a few days a flooding came on, which obliged her to keep her bed. The hæmorrhage increased, as soon as the patient got up; there was no pain in the abdomen, and no constipation; the pulse was weak and irregular, and from seventy-six to eighty in a minute. Revulsives, cold and acidulated drinks, clysters of cold water, and compresses dipped in iced water and applied to the thighs, had no effect. The ergot of rye was then employed, but as this excited vomiting, it was discontinued, and pills of the extract of monesia were ordered to be taken every hour, until an effect was produced. After fourteen pills the hæmorrhage ceased. The patient then took cold broth at intervals, and in spite of the lightness of this food, the discharge returned in the evening with violence, and again ceased after the exhibition of ten monesia pills.

On the following day, the dose of the medicine was diminished to seventy-five centigrammes (fourteen grains) and in six days the patient was quite well.

Quite lately, I employed the acrid principle in powder, in the dose of fifteen centigrammes (two grains and seven-tenths,) taken in a prune; it was to stop a uterine hæmorrhage, which had suddenly come on during the night; the discharge ceased the same day. But as this case stands alone, additional facts are necessary to prove the power of the acrid principle under such circumstances. In every case, monesia acts in a remarkable manner upon the uterus, when it is not in its natural state. This new medicine may be used in different ways, and it acts on different organs, particularly when they require to be strengthened without too much excitement.

This is confirmed by the following passage from M. Buchez:

"I have tried the extract of monesia," says this skilful practitioner, "in different affections of the mouth, particularly in inflammation of the gums, and uniformly with advantage. Its application produced a good effect, by almost instantaneously soothing the pain, which often accompanies inflammation. This mode of treatment I have found very successful

in the scorbutic swelling of desceased gums, and it has removed affections which had previously resisted other remedies. When caries of the teeth is attended with pain, the application of monesia is sure to remove it in a few moments."

When all the ascertained facts are compared together, one is struck by the very peculiar tonic action of monesia on every organ. As its powers have been tried in more than four hundred cases, we may be allowed to consider monesia as a very useful remedy, under several circumstances, particularly scrofulous affections and uterine hæmorrhage. Hence to the art of healing it is a real acquisition; nor is it to be imagined that this tonic has any analogy with those already known:* quite lately a tannin ointment, and monesia ointment were tried and compared with each other, and the advantage was on the side of the latter. Moreover, it is clear that every medicine acts in its own way, and that there cannot be two whose special effects are the same. Well informed practitioners know that one purgative cannot be indifferently substituted for another; that every narcotic has not, in the same degree, the power of soothing and producing sleep ; that the action of the various tonics is also very different ; and that the general effects of medicines are like the difference of faces; many resemble each other at the first glance, but none cansustain an exact comparison.

The London, from Paris Medical Gazette.

*There is some mistake in the original here : "que l'on ne croie pas que ce tonique ait quelque analogie avec ceux deja connus;" for, granting that its effects are not identical with those of any other tonic, there is a well marked anology.—*Translator.*

ART. XII.—MEMOIR UPON THE ORIGIN AND DISTINCTIVE CHARACTERS OF THE TURPENTINES. By M. GUIBOURT, Professor in the School of Pharmacy.

Read before the Society of Pharmacy of Paris.

I DESIRE to occupy the Society with some of the resinous productions known by the name of Turpentines. It is not because there can be brought forward many new circumstances connected with a subject so old and so often treated of, but because error is every where intermingled with truth, and even at the present time there exists among pharmaceutists and druggists so much uncertainty with respect to the distinction between the different species of turpentine, that it appears to me proper to set forth their characters with more precision than has hitherto been done. If I have been enabled to succeed in this undertaking, after much research and attention, I am indebted for it to the kindness of two fellow members, who, by their residence in the places where these products are obtained, have procured for me genuine specimens of them; one of the individuals is M. Bonjean, sen., of Chambery; the other is M. Choulettee, pharmacien, of Strasburgh.

With the ancients the word *Terebinthina* was but an adjective noun, which, joined to the generic name *Resina,* was exclusively applied to the product of the *Pistacia terebinthus. Resina terebinthina* meant resin of the *Turpentine,* as *resina lentiscina* signified that of the lentisck; *resina abietina* that of the fir, and so of the others; as *resina larix, or laricea, resina cyparissina, picea, pinea, strobilina,* &c.

But the superiority which for a long time was accorded to the *turpentine resin,* the name of which was most frequently employed in speech, and the habit assumed, for brevity, of dropping the word resin, have had the effect of converting the adjective into a specific noun substantive, and this in its turn became generic, when applied to other liquid resins, which were regarded as proper substitutes for the first. Finally, in our day, this noun has received a still larger signification,

which consists in bestowing it upon every fluid or soft vegetable product, formed of volatile oil and resin, without benzoic or cinnamic acids; as, for example, the fluid resins of *Copaifera*, *Balsamodendron*, *Hedwigia*, *Calophyllum*, &c. While, according in the utility of thus designating by a common and unequivocal appellation the preceding products, which, in reality, are neither balsams or resins, I shall here confine myself to the turpentine of the Pistacia terebinthus, and those of the Coniferæ of Europe, which are the Larches, the Pines, and Firs.

Of the Turpentine from the Pistacia terebinthus, or Chian Turpentine.

I have stated that the ancients recognised as turpentine only that from the *P. terebinthus.* They obtained it principally from the Grecian islands, from Lybia, Cyprus, Syria, and Judæa. Andromachus, the father, prescribed for the theriaca the turpentine of Lybia, at which Gallen wonders, as that of Chian was reputed best by all physicians. "Yet," says he, "I esteem that of Lybia equally well, when it is good, but it is not unknown that it is not always as good as that which comes from Chio. Good turpentine is also obtained from Pontus, and other places, but that of Chio is superior to all others for its odor and taste."

The ancients have praised this Chian turpentine highly, but at the same time have described it imperfectly. It is necessary to join together scraps of phrases in order to determine some of its characters, and still we are tempted to believe that they knew it only as it was more or less sophisticated. "Turpentine," Dioscorides tells us, "should be white, transparent, of the color of glass, inclining to blue, smelling of the tree. In qualities it is superior to all other resins; those which nearest approach it are the resins of the lentisck, of the pine and fir. Next come the resins of the pitch fir, and of the cones of the cultivated pine." Galen places in the first rank of resins that of the lentisck, or *mastic*, and of the others, says he,

turpentine is preferred, which possesses marked astriction, *joined to a certain bitterness.*

Jacques Sylvius adds two errors to the incomplete and inexact characters of Dioscorides and Galen. According to him, the best turpentine is of a bluish-white or greenish, transparent, and of the odor of the tree—*sub bitter, biting to the mouth and larynx, liquid.* Finally, by running over authors from Dioscorides to the present, we come to Pomet, before meeting with the true character of Chian turpentine. This substance, he tells us, is of almost solid consistence, of a greenish-white, almost without taste or odor, and especially destitute of bitterness, which distinguishes it from the other turpentines. Lemery, Tournefort, Chomel, and Murray, speak of this turpentine in almost the same terms, and the authors of our own time have scarcely varied from them. Yet many of them, as it will be easy to show by quotations, give still to this resin perfect transparency, a strong penetrating odor, and an acrid and bitter taste, or, indeed, an odor of citron, and a certain acridity; it is well, therefore, to settle definitely the true characters.

In the first place, Chian turpentine is not transparent. I have found in some shops and collections a resin perfectly transparent, very consistent, and of an agreeable but feeble odor, which was labelled Chian Turpentine; but the golden yellow color of this product, and its marked bitterness, made me suspect the name, and having, in fact, broken the upper layer, which was hard and inodorous, I found, interiorly, the fragrant and sweet odor of Canada balsam.

Chian turpentine is naturally very consistent, and it is often very solid. It is at least nebulous, and sometimes almost opaque. It is of a greenish-gray, or greenish-yellow color. Its odor appears very feeble in the air, but when it is enclosed in a glass vessel, this is retained sufficiently strong and agreeable, resembling that of fennel or gum elemi. It has a perfumed taste, devoid of all bitterness and acridity, and closely resembling that of mastic. Like mastic, Chian turpentine dissolves in all proportions in ether, and leaves, when treated by alcohol,

a glutiniform resin. This coincidence of properties is remarkable, but ought not to surprise us, on account of the close alliance of the trees which produce the two resins. Thus am I entirely of the opinion of authors who are unknown to me, but have been frequently cited by J. Bauhin, under the name of *monachi;* these monks say that when Chian turpentine is not to be procured, the substance which will best supply its place is mastic, and not the resins of the Coniferæ.

To finish that which refers to Chian turpentine, I shall call to mind a circumstance connected with the tree which produces it. According to Theophrastus, this tree is male or female. With the ancients, the qualifications referred to have no connexion with the sex of plants, but here they are found justly applied. Theophrastus alone distinguishes between two female trees: one bearing red fruit the size of a lentil, not edible, the other producing fruit, at first green, then red, finally black, and of the size of a bean. We could with difficulty comprehend, at present, the simultaneous existence of two different fruit-bearing trees for one sterile, if Duhamel had not given to us the explanation in his *Treatise upon Trees and Shrubs*, in accordance with the observation made upon the spot by Consineri; it is that this species comprehends three individuals, the first male, the second female, and the third androgynous, that is to say, carrying both male and female flowers. The last are those producing the smallest fruit, which is ligneous, and almost devoid of kernel. It is a singular conception of nature, where an organ is fitted to be fecundated, and the product is arrested in the middle of its development, and cannot serve for the reproduction of the species. The proper female trees alone furnish perfect fruit, susceptible of germination. This fruit very much resembles the pistachia, and may be eaten for them, although it is less agreeable, and is only employed by the lower classes. I have thought it proper to refer to the existence of these androgynous trees, because no mention is made of them in the modern books, and once an observer, after thinking he had made the discovery, experienced the mortification of being shown, by a thumber

of old books, that the fact had been known for a thousand years.

The Turpentine of the Larch.

This resin was known to the ancients, who obtained it from the same countries as ourselves; for Dioscorides tells us, "there is brought from Sub-Alpine Gaul (now Savoy) a resin which, by the inhabitants, is named *larica*, that is to say, obtained from the Larix;" but he tells us no more. Pliny sufficiently defines it by saying "the resin of the *larix* is abundant; it has the color of honey, is more tenacious, and never becomes hardened." But he knew very little of the tree, as he supposes it to be an evergreen, like the pines and firs.

Galen praises highly the resin of the larch, and compares it to the true turpentine. "Among the resins," he tells us, "there are two very sweet, the first is named *turpentine*, the second, *larix*. And again, " we, who know that the best of all the resins is turpentine, employ it in the confection of medicines, and yet if we have only that of the *larix*, why should we not use it, as it is like the other?" Yet further; "we have demonstrated that the resin named larix, is nearly the same as turpentine."

Finally he tells us, "the most humid (liquid) of all the resins, is another kind of *larix*, for this is, thus to speak, two-fold, one being entirely like turpentine, and the other more liquid, more acrid, hotter, and of a stronger odor."

It may be said that it was Galen who established the reputation of the resin of the larix, and who has caused also the confusion existing among the different products now known under the name of turpentine; the first, by the almost complete disappearance of that of the pistachia, which it was supposed unnecessary to procure; the second, by the idea which was generally spread, that the turpentine of the larch should be the most beautiful of Western Europe; a fact true only of that of the fir; hence merchants and druggists have mistaken the turpentine of the larch, for that of fir, and the contrary.

Mathiolus is the first author who can aid us in unravelling the confusion which has been stated. The following is what he says, in his commentaries upon Dioscorides, Liber I. Chap. 74.

"There is obtained from the larix, a resin erroneously named *turpentine,* since the true turpentine is derived from the pistachia; but as for a long period the merchants bring only a small quantity of this, physicians and druggists employ in its place the resin of the larch, and from this practice results the name given to it of turpentine."

"The inhabitants of Trent, and the adjacent country, give to the resin of the larch, the name of *larga,* derived from *laricea* or *larigna.* It does not flow naturally from the tree, and to obtain it, it is necessary to pierce the trunk to the centre with an auger. The resin which flows out, is received in vessels fabricated from the bark of the pine. The young trees produce the most transparent resin, and the old a thicker kind. The pitch tree produces between the bark and the wood a concrete resin like gum; sometimes, however, there runs from it a liquid resin like that of the larch; but it is the fir, which contains in its bark the excellent liquid named *lacrimo* or *tears of fir,* of which the ancients have said nothing that I know of, at least it is not thought to be that designated by Galen, as *liquid resin of the pitch tree,* which the colporteurs sold in place of turpentine."

"They are deceived, (continues Mathiolus,) who take the tears of the fir for the clearest resin of the larch. The first collects in vesicles, concealed between the laminæ of bark, and flows out when these are separated, while the resin of the larch flows, when the trunk of the tree has been perforated to the centre. Some mix the resins in order to increase the profit, as that of the fir is in higher estimation than the other; others again strain it several times, until it becomes transparent, in order to sell it for the resin of fir;—for there are few druggists who know how to distinguish the one from the other. Still the fraud can be detected, as the tear of fir is much more liquid, of an infinitely more agreeable odor, and of

a more bitter taste. If kept for a year, it acquires a feeble yellow color."

It follows from these passages of Mathiolus, that, in opposition to the authority of Galen, and the physicians who regarded the resin of the larch a suitable substitute for Chian turpentine, and place it in the first rank of indigenous turpentines, in his time, the turpentine of the fir was more esteemed, and of higher price. It was only the most transparent, and repeatedly strained turpentine of the larch, that could be mistaken for it, and yet this could be recognised by its greater liquidity, its infinitely more agreeable odor, and its more bitter taste, (this last character is inexact.) Again: much noise has been made in all the books on the Materia Medica, with respect to the Venice turpentine, which was the most beautiful of all, (always Chian turpentine excepted) and which on this account alone, has always been attributed to the larch. Well! this Venice turpentine was nothing else but that of the fir, as has been proved by Belon, in his work upon the Coniferæ, published in 1553.

"A great fraud (Belon tells us,) is committed daily by many persons, who openly employ the oily resin of fir, in place of turpentine. The true turpentine is neither liquid or entirely solid, but presents an intermediate consistence. Yet, like all other resins, it hardens by age. The resin of fir would never run from the tree, if it were not extracted artificially. The people in Italy, name it *olio d'aveto*, which is oil of fir. The French call it, *Venice turpentine*, to distinguish it from the larch, which they call *common turpentine.* The oily resin of the fir is extracted in the following manner: the herdsmen, that they may not be idle, frequent the place where the young firs grow, provided with a horn. They know that the firs with smooth bark abound with vesicles, while on the contrary the rugged bark of the old trees, is destitute of them. They then press the vesicles of the young trees, with the edge of the horn. However diligent they may be in this operation, they can scarcely collect more than four ounces of resin per day, for each vesicle does not contain

more than two drops at most. Hence, it is that this resin is rarer than the others, and dearer."

To finish the account of the resin of the larch, let us present the description given by Jean Bauhin, in his Historia Plantarum. "This resin is of the consistence of liquid honey, never becoming hard, of a yellow color, sometimes vitreous and transparent, and of a very bitter taste, moderately acrid, persistent, and odoriferous."

This short description is the most exact that has been published; and all those who have followed it, by deviating from it more or less, have thrown us into confusion. Of this I have cited, in the Historie Abregée des Drogues Simples, many examples which I will not repeat here. I had a long time, but without success, endeavored to procure an authentic specimen of the turpentine of the larch. Finally, in 1837, at the request of M. Bonjean, sen., pharmacien at Chambery, the Bishop of Maurienne granted permission to collect it in the woods of his bishoprick. This turpentine, which I submit to the Society, is thick and very consistent, as it remains some moments without running, when the vessel is turned up which contains it; it is uniformly cloudy, as if it held in suspension a resin in a minute state of subdivision, but the resin is not deposited upon standing, and the bottom of the vessel presents only a few earthy particles. It has an odor entirely peculiar, tenacious and oppressive, but more feeble than that of citron turpentine, but much less agreeable; weaker also than that of Bordeaux turpentine, and entirely different. It has a very bitter taste, which is persistent and connected with great acridity in the throat.

The larch turpentine for a long time preserves the same thick consistence, without forming in the air, and still less in a closed vessel, a dry and cracked pellicle upon its surface. When it is exposed to the atmosphere, spread in a thin layer upon a sheet of paper, after fifteen days the finger adheres to it strongly. Its drying property is then almost lost. It does not solidify appreciably by the addition of a $\frac{1}{16}$th of calcined magnesia. Lastly, it dissolves completely in five parts of alco-

hol, at 36°. The turpentine of the larch is not rare in commerce, where are found three species of the kind, well distinguished: 1st, *Common Turpentine*, or *Bordeaux Turpentine,* thick, granulated, opaque, of a strong smell, much used by the colormen, but rejected by apothecaries; 2d, *Citron Turpentine,* the most beautiful of all, liquid, of a sweet odor, of high price, and rarely employed; 3d, *Fine Common Turpentine*, most used in the shops, generally named *Strasburg Turpentine*, but in reality coming from Switzerland. This is produced by the larch. The only difference between it and the specimen of Maurienne, is that being collected in large quantity, and filtered and allowed to settle in large masses, it is more fluid and transparent, but never liquid, and never as transparent as the turpentine of the fir can be. The other characters are such as have been stated.

Journ. de Pharm.

(*To be Continued.*)

MINUTES OF THE PHILADELPHIA COLLEGE OF PHARMACY.

The annual meeting of the College was held March 30th, 1840.

Henry Troth, Vice President, in the Chair.

The minutes of last stated meeting were read and adopted.

The minutes of the Board of Trustees were read, from which the College is informed that Ambrose Smith, Linneus R. Gilliams, and Claudius B. Linn, have been duly elected *resident* members, and Thomas Seabrook an *associate* member of the Philadelphia College of Pharmacy.

The following gentlemen resigned their right of membership in this College, viz.: Joseph Scattergood, Charles H. Dingee, John H. Dingee, and D. L. Hutchinson.

The Annual Report from the Publishing Committee of the

American Journal of Pharmacy, was read and adopted. They state that the publication of the work entrusted to their care, under the authority and sanction of this College, has continued to claim their attention; that four numbers have issued from the press since their last report, fully sustaining, in their opinion, the reputation which the work has always enjoyed among its readers. They state that the arrearages due to the Journal, (principally from subscribers residing out of the city,) would exceed $300.

At a special meeting of this College, convened by direction of the President on the 21st of last February, the following communication was read:

Philadelphia, February 12th, 1840.

Dear Sir,—

I have been directed by the Committee for Revising and Publishing the United States Pharmacopœia, appointed by the late National Medical Convention at Washington, to address to the College of Pharmacy, over which you preside, in pursuance of a resolution of the Convention, a request for the co-operation of the College in the work in which the Committee is engaged.

I need not inform you that the Committee will be very happy to receive any suggestions in relation to amendments, additions, or omissions in the Pharmacopœia, which may be offered by the College. They venture to hope that the great importance of a uniform system in the nomenclature and preparation of medicines, and the interest which the Pharmaceutical, as well as Medical Profession, cannot but feel in this object, will induce the College to lend the valuable aid of their practical experience and skill.

With great respect,

George B. Wood, M. D.

Chairman of Committee for Revising and Publishing U. S. Pharmacopœia.

To D. B. Smith, Esq.,

President of the Philadelphia College of Pharmacy.

Whereupon it was

Resolved, That a committee of five members be appointed to take the foregoing communication into consideration, and to report at a future meeting what course to pursue.

The Chair appointed WILLIAM R. FISHER, HENRY TROTH, ELIAS DURAND, WILLIAM W. MOORE, and CHARLES ELLIS, that Committee.

The following is their Report:

To the President and Members of the Philadelphia College of Pharmacy.

GENTLEMEN:—

The Committee appointed by resolution of 21st of February, to take into consideration, and report at the next stated meeting, upon the communication addressed to the College, by the Committee of the National Convention for revising and publishing the United States Pharmacopœia, respectfully reports—

That, in accordance with the terms of the resolution under which they were appointed, they have duly considered the communication referred to them, and, after having examined and maturely deliberated upon the subject in all its bearings, they are disposed to recommend that the College accept the invitation which has been tendered to it, to become, to the extent of its abilities, a co-laborer in the great work in which the National Convention is engaged. The Committee is of opinion that the College possesses, within its range, ample means to contribute towards a National Pharmacopœia, and that from the intelligence, zeal, and industry of its members, may be derived important aid of a practical character, and of the highest utility. The pages of our own Journal, during the period which has elapsed since the publication of the last Pharmacopœia, exhibit conclusive evidence that neither talent nor industry are wanting on the part of the members and alumni of our institution, and the pages of that Pharmacopœia itself, show that the authority of our Journal, although then in its infancy, was deemed, by the Convention of that period,

sufficiently established and respected, to elicit regard to its suggestions and improved formulæ. Sensible of the advantage which must result from the combined labors of the medical and pharmaceutical professions, and of the oversight which had been committed by a former Convention, in not inviting the attendance of a delegation from the Colleges of Pharmacy of our country, the late Convention remedies the neglect by the passage of a resolution, seeking our co-operation; while in the schedule adopted as the constitution of the ensuing Convention, ample reparation is made, and due regard paid to the value and importance of a representation of practical pharmacy. The Committee, then, is of opinion that no feeling of neglect should be indulged, but on the contrary, that the National Convention has paid a tribute of respect to our body, and an acknowledgement of our ability to aid it, by its official act above referred to. Indeed, independently of all other considerations, our duty as good citizens requires that we should contribute our aid in a work so important to the health and well being of our neighbors and society, and impels us to communicate, for the general good, whatever study or observation may have placed within our grasp. No sentiment of injured pride should counteract duties of such character as these, nor induce us to withhold information from an apprehension that our services in the general account may be overlooked.

We regard the present as a favorable opportunity for asserting and evincing the claims which our College possesses for regard and utility, and that by no means can these claims be so efficiently maintained as by an exhibition of her powers, her ability, her zeal, and her earnest efforts to do good. The whole labor of preparing our National Pharmacopœia is a voluntary one, unattended by emolument or distinction for those who have undertaken it, and it becomes each of us to share in the burden, as we shall each share in the sole reward, a "mens sibi conscia recti,"—a mind conscious of having discharged its duty.

The Committee waives all further argument upon this sub-

ject, believing that sufficient reasons have now been assigned to establish the propriety of their recommendation, that the College should participate in the revision of the Pharmacopœia. They believe that every member will be disposed to assist, by adding his quota of experience or inquiry to the mass, and that valuable and essential amendments must result from the combination of our pharmaceutical with the medical science of the nation. Entertaining these views, they conceive they should be doing injustice to the College, the profession, and the country, were they to recommend any other course than that which they have already announced.

Having determined, then, what they should recommend as the proper action of the College upon the communication referred to them, the Committee anxiously sought to devise a mode by which the action of the College, if undertaken, should be rendered prompt and efficient. This they have endeavored to do by presenting a digested plan of operations, by which the Committee to be appointed hereafter on behalf of the College, shall be guided in the prosecution of their work. While they have endeavored so to frame this schedule or fundamental law, by which the Committee is to be governed, as to ensure a proper direction to, and systematic arrangement of their labors, it will be observed that its terms are so general in their character as to put no restraint upon individual judgment, as regards the revision of the work, and that in every respect the private personal views of those who may constitute that Committee, are unfettered in regard to the amendments which they may propose, whether alterations, additions, or abstractions, be their character. The Committee, in preparing this outline, which they mean to propose for the organization of the Committee of Revision, has been guided by the best model within their reach, perhaps any where to be found, the plan pursued by the Medico-Pharmaceutical Board, which effected the revision of the Paris Codex. And they deem the excellence of the work emanating from their councils a sufficient argument for our adoption of their mode of organization. In those details which have not been com-

municated by the French Board, your Committee have been governed by the best lights afforded by their own experience and judgment. It cannot be deemed essential that the Committee should here comment on the detail contained in the resolution which they propose to submit; but it is thought not altogether irrelevant to say a few words further in explanation of the course which it is proposed the Committee of Revision shall undertake, as well as one or two other considerations connected with the subject.

This is the first labor of the kind undertaken by the College, and there is every reason to believe that it will be regarded as a precedent by those who may succeed us in a similar duty, and that whatever course may be adopted now, will be regarded as an example worthy their imitation at least, if not absolutely imperative upon them. Let us, therefore, carefully examine and maturely decide upon what our course shall be, so that whatever importance our successors may attach to it, it shall, at least, deserve their respect as a model as perfect as we, without practised experience in revision, could have designed. Every step of our progress will hereafter be narrowly scanned, and we, therefore, from the outset, are called upon to be accurate and circumspect. From the appointment of our Committee, to the manner in which they shall proceed, the College of this day is responsible to those who may hereafter occupy the seats now filled by ourselves, and from a due sense of the responsibilities thus imposed, is the preparation of a code for the guidance of our Committee rendered the more imperative upon the College. So naturally and unconsciously in all cases do we look to our predecessors for advice and information, that we may reasonably anticipate such a retrospect and review of the early action of the College upon this subject, by the Committee who may be appointed, as will enable them to proceed knowingly and intelligibly to the discharge of their duties. This reference to precedent is by no means reprehensible, or to be shunned; on the contrary, it arises from a proper respect for the experience and attainments of age and intelligence, and must therefore

be regarded as decorous and commendable; we are led to refer to it merely as imposing duties of a peculiar character upon ourselves, in our action as a body. Anticipating the existence of this deference to our views, upon the part of the Committtee, we, by definite, decided action, point out the course which we would have them pursue, as calculated most efficiently to give energy, system, and excellence to their action. We tell them you must appoint a secretary, who must arrange and preserve your work. We tell them, you must subdivide your number, so that the known advantages resulting from a division of labor may be secured. We tell them, you must have frequent meetings, so that the labors of your sections may be examined and compared. We tell them, invite the co-operation of all who can render you assistance, or contribute to your usefulness, so that the greatest extent of information and inquiry may be embraced. We tell them, submit any doubtful matter to experiment, so that reliance may be placed upon the product of our formulæ. We tell them, be as speedy as you can, consistent with due care; and then we say, in fine, give the Pharmacopœia a complete revision. Reject what is useless, add what is wanting, improve what needs correction. We say, in addition, amend, alter, suggest, abolish, at your discretion, only give us your reasons, briefly as may be, so that you may satisfy us, and the profession, of the propriety of the change. Give us a work exhibiting the science of the age, and representing the progress of American Pharmacy and Medicine—twin sisters, whose growth and improvement from childhood to maturity, has been attended with the vigor of youth, and the bloom of health; which, heightened by the influences of united interests and pursuits, must fail entirely, or sensibly decay, in both, should rudeness sever, or neglect destroy, the bond of sympathy by which they are bound together.

With such instructions, it is conceived, the Committee can have no doubt as to their duties, and what course of action is expected of them, and the College is itself relieved of all the charge imposed upon it, in establishing a precedent for future

guidance. Far be it from this Committee to assert that such a course as is here recommended is faultless, and unsusceptible of improvement, but they do say such amendments have not occurred to themselves, and that in the plan offered is a good basis upon which experience may erect an improved structure.

But little more remains to be said, on this subject, but the Committee cannot refrain from directing the attention of the College to the fact, that in each branch of the proposed plan to which reference has been made, ample room for individual judgment has been reserved, and that the independent exercise of sound discretion is left untrammelled. In the choice of their Secretary, in their subdivision into minor committees, in determining the period at which they shall convene and commune, in looking abroad and around for coadjutors, in determining what shall be submitted to experiment, and how those experiments shall proceed, in completing their work with a speed consistent with its proper execution, as great a range for the display of discretion and judgment, of intellect and industry, is afforded as can be at all desired by the most independent, or restive of restraint, among us. As members of the College, however, all those who may constitute the Committee, will have, indeed, at this moment enjoy, the right to propose any alteration, which may be thought desirable or necessary.

The Committee leave this branch of the subject, under a firm consciousness that their motives, at all events, in recommending what they do, are incapable of being impugned for faithlessness, to the true interests or honor of the College.

In regard to the extent to which the revision of the Pharmacopœia shall be carried, the Committee have nothing to say, conceiving that inquiry to belong exclusively to the Committee of Revision, and not to be at all within the sphere of their duties. Not in this light, however, did they regard an inquiry into the means and resources which the College possesses for carrying on the revision, as it would be needless in them to recommend the inception of a labor, which at the

same moment, they are conscious may never reach completion. Such a condition, however, as regards the work they recommend, is altogether hypothetic, as they have ascertained by personal inquiry that a committee of the number proposed can be readily selected from the College, who will zealously and industriously discharge the duty to which they will be assigned; and that efficient additional co-operation may be relied upon, to be derived from the service of those whose avocations will not permit a constant devotion to the subject, as well as from the valuable inquiries and manipulations of such of our alumni, as have not yet been associated with us as members. The Committee have, in a former part of this report, indicated their confidence in the professional ability possessed by the College for the faithful prosecution of the work, and they are here gratified to add their conviction that laborers are not wanting to ensure its able execution. They find that the College will be enabled to call to its service, the more mature councils of experienced, as well as the vigor and alacrity of younger minds, and that every desirable element can thus be blended in the discharge of this duty. Delicacy forbids that they should here enter more minutely into this subject; they, therefore, have prepared, and will submit, for the aid of the appointing power, a list of those who may be relied upon as capable and ready to perform the labor, and from whom a selection may be made.

The Committee cannot take leave of the inquiry proposed for them without adding a few words on the great importance of the main subject, the preparation of a National Pharmacopœia, possessing the necessary character to ensure uniformity by its general adoption. Such a work is of vast importance to society, and indispensable for a united understanding between the two professions for whose use it is expressly designed: a lamented want of uniformity in the preparations and nomenclature exists throughout our country, indeed our own community, and every effort should be made to remove this defect. It can only be accomplished by some sacrifice of individual judgment, and by a strict regard to the directions and

proportions emanating from the national representatives of Medicine and Pharmacy, in the results of whose counsels we may have perfect confidence, if we find all measures undertaken solely with a view to the general good, without party feeling, prejudice, or selfishness, all sections represented, and all sources of information opened for the examination and instruction of all.

To such a work we are now, for the first time, to bring our stores of professional acquisition, and it becomes us to do so without reserve or hesitation. Let us freely contribute our share to a work destined for our own information, and to some extent control, that we may have the cherished privilege enjoyed by the citizens of our happy land, in their civil capacity, of living under laws of our own creation. So let it be with our professional ordinances; let us participate in their enactment, and then, as good citizens or subjects, we may implicitly and conscientiously obey them.

In conclusion, the Committee will only add, that they submit their labors for the consideration of the College, conscious that they admit of examination and scrutiny, which, they trust, may be extended to them, in order that the action of the College may be rendered as complete and perfect as can be attained. Nothing but a sense of the consequences depending upon our first embarkation in such a cause, would have induced the Committee (or even justified them in doing so) to have occupied so much space in detailing their views. They cannot doubt but that their motives will be appreciated, and that they will not be charged with having attached too much importance to the duties assigned them.

They close with recommending the annexed resolutions :—

Whereas, The Committee for revising and publishing the U. S. Pharmacopœia, has, in pursuance of a resolution of the National Convention, addressed this College, and requested the co-operation of the College in the work in which said Committee is engaged; and, *whereas,* the great importance of a uniform system in the nomenclature, and preparation of medicines, and the interest which the pharmaceutic, no less than

the medical profession feel in this subject, render it highly important and proper that this College should contribute the valuable aid of the experience and practical skill of its members, in the most efficient way:

Therefore, Resolved, That this College acceding to this request, will undertake to procure a revision of the United States Pharmacopœia, to be submitted to the Committee of the Convention, to which all other projected amendments have been referred.

Resolved, That a Committee of six members shall be appointed, who shall be styled the Committee of Revision, and to whom shall be entrusted the entire charge of the work; to be subjected to the annexed provisions and regulations.

1st. The Committee shall appoint a Secretary; and subdivide into sections of such size as shall contribute most advantageously to a division of the labor.

2d. When thus organized, the Committee shall have power to fill vacancies; and invite the co-operation of members and graduates of the College.

3d. The Committee shall hold stated meetings at least once in two weeks, at times to be selected by it.

4th. The Secretary, who may be chosen from the College at large, or its graduates, shall keep a journal of proceedings, and arrange and compile the general results, so as to produce a systematic work.

5th. The Committee shall subject the Pharmacopœia to a thorough revision;—by adding to the Materia Medica such new remedies as use has established;—by removing obsolete or unworthy articles;—by adding to, and removing from the Preparations, in like manner and for like reasons;—by suggesting such amendments in formulæ, as experience or investigation may show to be proper;—by subjecting to experiment all such processes as, in their opinion, may require it, and generally shall make such alterations and amendments as in their best judgment may be needed, to bring the work up to the improved state of modern pharmacy, and to render it a type of the existing condition of the profession in this country.

6th. The Committee shall assign, as briefly as may be, the reasons for any changes which they may make, so that their propriety may be determined.

7th. The Committee shall prosecute the work as rapidly as is consistent with due care, and its proper execution; and so soon as finished, shall make a general report to the College.

All of which is respectfully submitted.

WM. R. FISHER,
E. DURAND,
CHARLES ELLIS,
HENRY TROTH.

Philadelphia, March 11th, 1840.

This being the evening for the annual election, the following officers, trustees, &c. were elected, viz:

President—D. B. SMITH.

Vice Presidents—HENRY TROTH, GEORGE B. WOOD.

Secretary—CHARLES ELLIS.

Corresponding Secretary—ELIAS DURAND.

Treasurer—S. F. TROTH.

Publishing Committee of American Journal of Pharmacy.

DR. CARSON,	D. PARRISH,
G. B. WOOD,	E. DURAND,
C. ELLIS,	JOHN C. ALLEN,
DR. BRIDGES,	WM. HODGSON,
DR. BACHE,	D. B. SMITH.

Trustees.

WARDER MORRIS,	DR. F. BACHE,
DR. JOSEPH CARSON,	WM. W. MOORE,
EDWARD ROBERTS,	JOHN WETHERILL, JR.
JOSEPH C. TURNPENNY,	CLEMENT CRESSON,
DILLWYN PARRISH,	PETER LEHMAN,
THOMAS H. POWERS,	DR. ROBERT BRIDGES,
RICHARD M. REEVE,	AMBROSE SMITH,
JACOB BIGONETT,	JAMES HOPKINS.

The Chair appointed the following Committee on revising United States Pharmacopœia.

WM. R. FISHER, Chairman,	WM. W. MOORE,
CHARLES ELLIS,	THOMAS H. POWERS,
ELIAS DURAND,	JOHN C. ALLEN.

TO THE MEMBERS AND GRADUATES OF THE PHILADELPHIA COLLEGE OF PHARMACY.

The College of Pharmacy having engaged to prepare a complete revision of the United States Pharmacopœia, and the "Committee of Revision" being now organised, and about to engage in the active discharge of its duties, the aid and co-operation of the members and graduates of the College, in carrying forward the important work, to the due and successful execution of which the honor and standing of the College is pledged, are respectfully invited. Solicitous for the reputation of our institution, and anxious for the diffusion of all the light which can possibly be elicited, the "Committee of Revision" appeals to those who hold that reputation dear, who possess the means of irradiating much practical and theoretic truth, and without whose aid the most assiduous industry of the Committee will be insufficient to do full justice to the subject, to contribute fully and freely the result of their reflections, experience, and research, so that the revised work, which it is the duty of the Committee to prepare, shall exhibit the improved state of modern Pharmacy, and present a type of the condition of the science in this country. Referring to the preceding report of the committee who inquired into the expediency of engaging in this enterprise, for an explanation of the views under which the present Committee is appointed, the undersigned again renew the request that any suggestions, as regards alterations or additions, may be left with either member of the Committee, or

the Secretary. The stated meetings of the Committee will be held on every second Tuesday, commencing on the 21st of this month. It is desired that all communications should fully detail the reasons for alterations; and such comments upon new formulæ as will ensure their claims to preference over others which may have been suggested for the same preparation. It will also be proper to accompany formulæ with specimens of their results.

By order of the Committee of Revision.

WM. R. FISHER, *Chairman.*

WILLIAM PROCTER, Jr., *Secretary.*

The Committee consists of—

WILLIAM R. FISHER,	WILLIAM W. MOORE,
CHARLES ELLIS,	THOMAS H. POWERS,
ELIAS DURAND,	JOHN C. ALLEN.

WILLIAM PROCTER, Jr., *Secretary.*

April, 1840.

MISCELLANY.

Tests for Opium—Mode of keeping Extracts.—At a meeting of the Medico-Botanical Society, April, 1839, Mr. Everitt stated, that having lately had to conduct experiments for the purpose of deciding whether opium were present or not in the stomach of persons on whom a coroner's jury had to sit, he had paid some extra attention to the subject. Generally speaking, in the search after opium, it was the object of the chemist to eliminate the morphia; but it was difficult to decide whether this was present or not, inasmuch as other alkaloids would give the same results when experimented upon. Chemists had long known that meconic acid, when acted upon by a solution of a peroxide salt of iron, was changed to a deep-red color. So far, then, it was a test of the presence of opium. This test, however, was liable to doubt, inasmuch as sulphocyanic acid, which Tiedemann had proved to exist in the saliva, would be acted upon similarly to the meconic acid, on the addition of a solution of a per-salt of iron. Hence, at a trial at Glasgow, in which there could be little doubt that opium was present in the stomach of a person supposed to have been killed, the counsel for the defence of the prisoner objected to the testing of the presence of meconic acid by the solution of iron, on the above ground, and the objection was considered fatal. He (Mr. Everitt) had endeavored of late to obtain, by experiment, the means of distinguishing whether the red color in question was produced by the presence of meconic acid, or of sulphocyanic acid.* After a number of experiments upon this point, he had found that if the red color depended upon the presence of sulphocyanic acid, the addition of a solution of corrosive sublimate had at once an entire bleaching effect upon the tested liquid; while, on the contrary, should the red color depend upon the presence of meconic acid, the solution of corrosive sublimate would have no effect. The above test had held good in a great variety of experiments in which the tested fluid was combined with various animal secretions, &c.

Mr. Everitt then exhibited a preparation of extract of henbane, which he had kept in a close-stopped bottle for two years; the extract was in a high state of preservation. Previous to placing it in the bottle, he had drawn off all the moisture from the extract by placing it under an air pump with sulphuric acid. Mr. Everitt then threw out some hints on the advantage of keeping extracts free from moisture.—*Lancet.*

* Nearly ten years ago Dr. O'Shaughnessy pointed out in THE LANCET, the fact that the meconate and sulphocyanate of iron might be distinguished one from another by means of an alkaline solution. The sulphocyanate is immediately *bleached* to a dead pale white by the alkali, while the meconate, on the contrary, becomes deeper in its tint.—LD. ED.

THE

AMERICAN JOURNAL

OF

PHARMACY.

JULY, 1840.

ART. XIII.—ON CUCUMIS CITRULLUS. By Benjamin I. Ritter.

(*An Inaugural Essay.*)

Although this plant has not been made officinal in any of the Pharmacopœias, it is well known to have medicinal properties, which, by some practitioners, are considered valuable.

The seeds, particularly, have acquired considerable celebrity for their diuretic effects, and the nutritious and delightfully refrigerant qualities of the pulp, are universally known and acknowledged.

Botanical History.—The *Cucumis citrullus* belongs to the class *Monœcia*, order *Monadelphia*, L., and to the natural family *Cucurbitaceæ*, Lind.

Generic Characters.—Staminate flowers five-toothed; carolla five-cleft; filaments three; pistillate flowers, calyx and carolla like the staminate. Pistil three-cleft.

Specific description.—Plant annual, hairy; stem creeping procumbent, from ten to fifteen feet long, slender, angular, somewhat branching; tendrils also branching; leaves three to five inches in length, by two to four in width, ovate in their out-

line, generally five-lobed, sinuate, pinnatifid. Segments all obtuse; petals two to three inches long, erect. Flowers axillary, on hairy peduncles; carolla pale greenish-yellow, or ochre colored. Fruit, a melon from six inches to a foot in diameter, twelve to eighteen or twenty inches long, elliptic, subglobose, smooth, with a firm, fleshy rind. When mature, the pulp enclosed is tender, watery, saccharine, and pleasant to the taste; of a red color generally, but frequently yellow, and sometimes white.

Observations and General History.—Merat and De Lens, in their *Dictionnaire Universel,* state that the C. *citrullus* grows in the Levant, in Egypt, and Italy, along the shores of the Mediterranean. The fruit is supposed to come to greater perfection in the vicinity of the sea. "Owing to their refrigerant quality, the melons are used in tropical climates instead of ice." "In Italy," say they, "they are sold in the market places under the name *Cocomero.*"

Tournefort states, "that in the Levant they are much esteemed, and are eaten by the natives in any quantity, without bad effect, and that they retain their agreeable coolness even when exposed to the heat of the sun.

Molina, in his work on *Chili,* says that they have a very excellent variety, with a rind as thin as paper.

In Senegal the fruit is called *Pompion,* and frequently attains the enormous weight of sixty, or even more pounds.

Habitat.—This plant is exotic, no native varieties having been found in the United States.

It has been introduced from the warmer climate of the south of Europe and Asia, and is now extensively cultivated throughout our country, particularly in New Jersey and the Carolinas, where the soil seems well suited to the habit of the plant, and the fruit comes to the greatest perfection.

Common Name—Water Melon.

The seeds being the portion used in medicine, are more particularly the subject of this essay.

Sensible Properties.—The seeds are numerous, obovate, raised at their margin, varying greatly in color from white to

brown, or even black. The kernel is white, amylaceous in its appearance, oily to the taste, resembling that of the almond. It is enclosed in a hard ligneous shell, which, when dry, is easily removed. They emit, when bruised, a peculiar pleasant odor, which is not possessed by any other portion of the plant.

As found in the shops, the seeds are depressed in the middle, showing more distinctly the characteristic rim around the margin.

They are variously colored, sometimes singularly mottled with white and brown, or black.

Seeds of several colors frequently occur in the same melon. The coloring matter, however, is confined entirely to the outer coating. The shell itself, and the nucleus, are always white.

CHEMICAL CONSTITUTION.

Although frequently used by our physicians in city, and oftener in country practice, this article is not mentioned in any of the works on Pharmacy, to which I have had access; and, as far as I have been able to discover, there has never been an analysis made.

With a view to throw some light upon the chemical constitution of the seeds of the *Cucumis citrullus*, I have been induced to make the following experiments. The seeds used were collected when the fruit was fully ripe, and were carefully dried in the shade.

Experiment 1.—A decoction was made by boiling one ounce of the bruised seeds in a pint of water for fifteen minutes. This presented a thick milky appearance, similar to an emulsion of oil with gum. On cooling, a copious white flocculent precipitate was separated, leaving the supernatant fluid clear and of a bright yellow color. Tested with tincture of iodine, the clear decoction remained unchanged, while the precipitate gave indication of the presence of starch in large proportion.

Experiment 2.—To the filtered decoction was added a solution of sub-acetate of lead; this threw down a whitish

curdy precipitate, corresponding with the compound of lead and gum of Berzelius. Alcohol also threw down gum from this decoction, and lime water changed the color to a deep yellow.

Experiment 3.—An ethereal tincture was made, by macerating an ounce of the bruised seeds in four ounces of sulphuric ether, for ninety-six hours. Filtered and evaporated by a sand bath, the result was one drachm of fixed oil, of a beautiful yellow color, possessing the odor and saccharine taste of the seeds.

This oil is soluble in absolute alcohol, has a specific gravity of .915, leaves a permanent greasy stain upon paper, and when burning, gives off much sooty vapor. The ethereal extract is of a dark brown color, consisting of oily, resinous, and coloring matters.

Experiment 4.—One ounce of the bruised seeds was digested in four ounces of alcohol 35° Baumé, for ninety-six hours; filtered and evaporated by a sand bath to the consistence of an extract. This was of a dark brown color, unctuous to the touch, slightly bitter to the taste, partially soluble in cold water, (imparting to that menstruum a dark orange color,) and having a decidedly acid reaction with litmus paper. The persulphate of iron indicated the presence of *gallic acid,* by changing the solution to a deep bluish-black color.

Experiment 5.—After incinerating four hundred and eighty grains, there remained in the crucible sixty grains of grayish black ashes. These were lixiviated with boiling water and the solution filtered. The clear solution was alkaline to the taste, and restored the color to litmus paper which had been reddened by an acid. Neutralized by nitric acid and evaporated, it yielded a crystalline salt resembling *nitrate of potassa.*

Experiment 6.—I treated the insoluble residue of the preceding experiment with nitric acid. When diluted and filtered, and tested with oxalate of ammonia, a slight precipitate indicated the presence of lime in small proportion. Ferrocyanate of potassa (the usual test for iron) did not indicate the presence of that element among the constituents.

Experiment 7.—A pint of water was added to two ounces of the bruised seeds, and distilled over two-thirds. The water was slightly clouded, presenting a somewhat milky appearance; it possessed the odor and taste of the seeds, but contained no volatile oil. The residue in the retort was then strained and subjected to destructive distillation; about a drachm of a thick black viscid substance was obtained, composed entirely of gum, fecula, and coloring matter, insoluble in alcohol and ether, entirely soluble in boiling water. From the aqueous solution, the gum was precipitated by subacetate of lead, and the starch by the tincture of iodine.

The coloring matter which remained in solution was not deemed of sufficient importance for further experiment, as it was probably darkened in color by the temperature to which it was subjected.

Summary.—From the results of the foregoing experiments we may reasonably conclude that the principal constituents of the seeds of the C. *citrullus* are,—first, *gum;* second, *starch;* third, *resin;* fourth, *coloring matter;* fifth, *fixed oil* in large proportion; sixth, *salts of potassa*, and probably *lime;* seventh, *gallic acid;* eighth, *lignin;* and ninth, *uncrystallizable sugar.*

AXT. XIV.—REMARKS ON TINCTURE OF KINO.

By Benjamin I. Ritter.

Soon after the introduction of the method of displacement, I made numerous experiments with the apparatus, and found it answered admirably, even better than the high estimate of its advantages had led me to expect. In the business in which I am engaged, I have used it for more than two years for a great variety of purposes, and have never been disappointed in the result. Nearly all tinctures may be advantageously prepared by this method. The process will soon, I have little doubt, supersede the old plan of decoction in making aqueous solutions of active principles, as all the volatile matter may be retained, while they must unavoidably be in a great measure dissipated by the heat employed in decoction. In this way syrup of sarsaparilla, of very superior quality, may be prepared; first, making a strong cold infusion by passing the menstruum repeatedly through the ingredients in the apparatus, then adding sugar as in any other kind of syrup.

Having frequently, in the dispensation of medicine, to make use of Tincture of Kino, I have been put to great inconvenience by not having the article in a state fit for use when prescribed by a physician. It is well known that this tincture, made by the method directed in the Pharmacopœia, is subject to a change (after standing a short time) which renders it unfit for use.

In consolidating, its medical as well as sensible proporties become altered: it loses nearly all the astringency on which its activity, as a remedy, depends, and when allowed to stand until it granulates, it is tough, like caoutchouc, and is insoluble in water. Under these circumstances, the only alternative is to make it in small quantity, when ordered.

This I found was a very inelegant preparation. It was always gritty from the undissolved particles, and never clear and translucent, as it should have been. In this stage of my difficulty I thought of the displacement principle, and imme-

diately tried it on a small scale. This answered very well; in a small instrument of my own construction, I was enabled to make a tincture, saturated with the astringent principle of the extract, in a few minutes.

This apparatus I used to my entire satisfaction, until the idea struck me that, when made on a large scale, by the same method, the tincture would be less likely to change than when the alcohol was allowed to stand two weeks on the material. I made a quantity of the tincture on the 1st of January, 1839. A considerable quantity still remains: it has not undergone the least change, is of a deep garnet color, perfectly transparent, and of a powerfully astringent taste; in short, I believe it to be just as good as it was the day it was made. In the tenth month of my experiment, an article was published in this Journal, by Mr. A. Duhamel, giving his experience on the same subject for the six months previous.

Seeing the end thus answered, (that of giving publicity to an improved process,) I concluded not to write upon the subject, until now that nearly another year has elapsed, without having made any change in the tincture. I consider that a publication of the facts may induce others to adopt the same course. I give the formula employed by me in making the tincture by the improved process:

℞.—Kino,	℥iij.
Alcohol,	Oij.

Reduce to a coarse powder, mix with an equal bulk of clean sand; then place in the filter, and pass the alcohol through it in successive portions, until it passes colorless.

I shall conclude by recommending the apparatus to all druggists who have not already adopted its use.

No apothecary should be without it. The Boullay filter (as it is called) costs no more than a common funnel, and may be applied to every purpose in which that useful instrument is employed; as a filter, it answers a better purpose than passing a turbid solution through paper, because it is less trouble, can be done in less time, and there is no breakage of filters, which so frequently occurs when paper is used. You

have only to place broken glass, straw, or cotton, in the lower part of the instrument, and cover with sand or animal charcoal; then pour on the liquid, reject the first portion that passes till it comes through clear. In this way, much time and trouble may be saved. Too much cannot be said in praise of this invention. I have now done with the subject, and hope that, as it becomes better understood, persons who make successful experiments will give them publicity, for the benefit of our profession.

June 11, 1840.

ART. XV.—NOTE ON TINCTURE OF KINO. By S. Shepherd.

My attention having been called to the subject of displacement by the article on that subject in the third number of the last volume, I prepared a Tincture of Kino by that process, which has given me much satisfaction. I prepared, at the same time, a small quantity of the tincture by the usual mode. In less than four weeks, the last has displayed the disposition to gelatinize, while the first is as limpid as possible. I also prepared a tincture of nux vomica by the displacement mode, which gives me entire satisfaction. I would suggest to my brethren in Pharmacy, that an advantage would result from dividing the menstruum into three parts, and returning each part several times upon the ingredients, thus ensuring the complete saturation of the two first, and being certain that the last part exhausts all the active principle.

Seventh month 1st, 1840.

ART. XVI.—NOTICE OF PROFESSOR KANE'S RESEARCHES ON THE AMMONIACAL COMPOUNDS. (*Trans. Royal Irish Academy.*)

The action of ammonia on various salts, and the mutual decomposition which frequently results from this reaction, has become of much importance in the explanation of chemical phenomena. In a former number of this journal will be found the observations of Dumas, who was the first to conceive that ammonia itself underwent a decomposition under certain circumstances, and that the result was the production of amidogen, a hypothetical compound, containing one equivalent less of hydrogen than the body from which it was derived. Farther research has led to a more extensive application of these views, so as greatly to increase the probability of the correctness of the theory, and to render it necessary that several compounds formed by the action of ammonia, should be considered in a new light, and with different ideas as to their composition. To illustrate this subject to a greater extent, we have taken advantage of Professor Kane's labors, as the most extensive, and, in reviewing his researches, we shall avail ourselves of any observation of others tending to illustrate the same point.

From the alkaline nature of ammonia, the *a priori* conclusion would be, that its action would be analogous to that of bodies of similar character; but, in point of fact, while in some instances this analogy is fully borne out, there are others in which it exhibits the utmost difference ; and of this its action on corrosive sublimate forms a very striking example, which has long attracted the attention of chemists. When ammonia is added to a solution of corrosive sublimate, a white powder, known as a white precipitate, is formed, and the solution consists entirely of muriate of ammonia. To explain this reaction, we may suppose either that ammonia enters undecomposed into the new salt and forms a double muriate of ammo-

nia and mercury, or that, being decomposed, amidogen unites with a portion of the mercury, and forms an amidet of mercury, which unites with the chloride already present, to produce the white precipitate. The following formula will show these two modes of decomposition ; but in the former instance it is necessary to consider the water present as taking part in the decomposition, while in the latter it may be entirely neglected.

$$2Cl^2Hg+4NH^3+4HO=2(ClH,NH^3)+2(ClH,HgO^2,NH^3)$$
$$2Cl^2Hg+4NH^3 \qquad =2(ClH,NH^3)+(Cl^2Hg+Hg2NH^2)$$

In the first, four equivalents of ammonia, and four equivalents of water, acting on two equivalents of bichloride of mercury, there results two equivalents of muriate of ammonia and two equivalents of muriate of ammonia and deutoxide of mercury ; and in the second, omitting the water, we have the two equivalents of bichloride and the four equivalents of ammonia mutually reacting with decomposition of half of each, two equivalents of the chlorine of the bichloride uniting with two equivalents of the hydrogen of the ammonia, to form hydrochloric acid, which unites with the remainder of the ammonia to form the muriate of ammonia, and there is left one equivalent of undecómposed bichloride of mercury and one equivalent of metallic mercury, with two equivalents of amidogen, to unite and form the biamidet of mercury.

To ascertain to which of these views we should give credence, it is necessary to resort to the results of analysis. Here we are at once met by the discrepant statements which are given by the different chemists who have examined this preparation,—the mercury varying from 74 to 82 per cent., and the chlorine and ammonia in like proportion. To account for this, it is only necessary to consider how readily the salt is decomposed by hot water, and even by cold water, when used in large quantity,—also that as two methods are usually directed to obtain this preparation, the results of which are somewhat different in composition, the substance analysed would necessarily afford different proportional results.

Professor Kane in the preparation of this article for analysis, appears to have exercised every requisite caution to obtain a preparation which should give accurate results. The process adopted was to add to a cold solution of bichloride of mercury, a slight excess of water of ammonia; the whole was then thrown on a filter, and the liquor allowed to drain away as much as possible; then distilled water was poured over the precipitate, so as to remove entirely the whole of the original liquor, the use of any excess being carefully avoided, lest any decomposition should be produced, a fact which would be evinced by the injury of the pure milk white color of the precipitate.

The preparation thus obtained is perfectly white, and is insoluble in water without decomposition. When washed with a large quantity of cold, or a smaller quantity of hot water, or boiled in this liquid for a few moments, it is decomposed, and a heavy powder, of a canary yellow color results, which, when dry, presents a granular appearance. If potassa or soda be added to the liquid and boiled, the same decomposition results, the products being the same as when water is used, the purity of the yellow color alone being injured by the use of the alkali. When the alkali itself is mixed with the white precipitate, the same yellow color is produced, and ammonia is disengaged, but not more than one half of the ammonia can be liberated by this alkali. White precipitate dissolves readily in nitric and hydrochloric acids, from which solutions it is not again precipitated by the addition of ammonia. These same solutions are probably formed when nitrate or hydrochlorate of ammonia is digested on the peroxide of mercury, when, according to the experiments of Messrs. Brett and Thompson, solution of the oxide takes place with the disengagement of ammonia. From the solution in hydrochloric acid, the iodide of potassium throws down a red powder, which is the periodide of mercury, and the sulphuret of barium, a black precipitate of the persulphuret of mercury, while, in the former instance, the hydrochlorate of ammonia and chloride of potassium remains in solution. A similar reaction takes place when the solutions

of the same salts are added to the dry white precipitate, only all the ammonia is now liberated, and the liquor contains chloride of potassium and free potassa. When white precipitate is heated to a temperature below a red heat, in a tube closed at one end, it is decomposed ; calomel sublimes and ammonia, and nitrogen is given off, together with watery vapor.

Having, by careful preparation, obtained an article upon which reliance could be placed, Prof. Kane trusted to diminish the errors of analysis by taking the average of numerous results, these results being obtained by processes differing in principle, thus avoiding any liability of the same error pervading the whole.

As when ammonia is added to a solution of bichloride of mercury, the whole of the mercury is precipitated, hydrochlorate of ammonia remaining in solution, it is evident that knowing the quantity of mercury contained in the bichloride used, and ascertaining the amount of chlorine abstracted by the ammonia and held in solution, the whole of the mercury, and the residue of the chlorine, will be the amount of these two substances in the precipitate obtained, the weight of which is to be ascertained when perfectly dry.

Taking, therefore, 100 grains of bichloride, which contains 74.09 of mercury, the average result of five different experiments gave,

Precipitate.	Chlorine.	Mercury.
93.1	12.91	74.09

Or 100 parts of the precipitate contains

Ch	13.87
Hg	79.57
Leaving a deficit of	6.56
	100.00

to be accounted for as oxygen and ammonia, or as amidogen.

The decomposition of the white precipitate by heat, affords another mode of determining the amount of the ingredients

entering into its composition. For, as the products are calomel, ammonia, nitrogen, and watery vapor, we have all the data necessary for the purpose ; the calomel giving the amount of chlorine and mercury, while the ammonia, nitrogen, and water will give the ammonia and oxygen, or the amidogen and water, entering into its composition. The result of 4 experiments gave, as a mean,

Calomel, 92.98 or	Hg	79.14
	Cl	13.84
	NH^3	3.87
	N	2.19
	HO	.58
	Loss	.38
		100

The value of the mercury may also be obtained by the process of reduction, the solution in hydrochloric acid being acted on by protochloride of tin, and the resulting mercury weighed. The mean of two experiments gave,

Hg 77.7 per cent.

The decomposition of the hydrochloric solution, by sulphuretted hydrogen, afforded also results by which the amount of mercury and ammonia could be estimated. The resulting precipitate of bisulphuret being carefully dried and weighed, and the solution from which it was deposited being evaporated to dryness, and the hydrochlorate of ammonia weighed, gave data from which it was estimated that 100 parts of the precipitate yielded

Hg	77.96
NH^3	7.06

Heating white precipitate with a solution of sulphuret of barium, and passing the resulting vapor of water and the ammonia into a dilute solution of hydrochloric acid, a solution of

muriate of ammonia was procured, from which the ammonia was estimated at 6.72 per cent.

The same process, substituting iodide of potassium for the sulphuret, gave the ammonia as 6.33.

In all the theories previously advanced, oxygen is enumerated as one of the ingredients in white precipitate, in sufficient amount to peroxidize the whole of the mercury. According to the results of the decomposition by heat, the only product in which the oxygen is to be found is the aqueous vapor, which, if this element be present, should result from its union with the hydrogen of the ammonia, and thus liberating nitrogen, which is also one of the products. To ascertain the amount of this vapor, a desiccating tube, sometimes containing lime, at others potassa, was attached to the apparatus used in this decomposition, its increase of weight denoting the amount of water retained. The results of four experiments, in the last of which no perceptible increase of the desiccating tube could be perceived, gave, as a mean, 0.583 per cent. of water, an amount so small as to afford strong presumption that it was derived from an imperfect drying of the precipitate. The average of the ammonia derived from the same experiments, the nitrogen being previously converted into ammonia and added to the amount of that alkali obtained, was 6.61 per cent.

Summing up the results of these various operations, and taking the mean of the whole, the composition of white precipitate will be

Hg	78.60
Cl	13.85
NH^3	6.77
HO, O } loss	0.78
	100.00

From which the following formula may be deduced :

$$Hg+Cl+NH^3$$

Omitting the water as too small to constitute one of the constituents of the compound.

This result differs in giving the amount of mercury and chlorine at a higher estimate than that derived from the results obtained by other chemists, with the exception of Guibourt, whose analysis on these points agrees remarkably with the above, but varies in making the ammonia about one-half the quantity, the balance being estimated as oxygen. This result was probably due to the mode of analysis adopted by Guibourt, based on the supposition that potassa liberated all the ammonia from the precipitate, the loss being supposed to be oxygen. But Prof. Kane has shown that only one-half of the ammonia is thus liberated, and that an analysis conducted in this way necessarily leads to this erroneous result from the inability of potassa to produce complete decomposition.

The above formula does not, however, explain the phenomena resulting from the action of heat upon white precipitate, for a substance composed as above, should yield calomel and ammonia, not calomel, ammonia and nitrogen, when exposed to heat.

Dumas' researches has led to the probability that, in oxamide, benzamide, &c., there exists a body composed of NH^2, capable of combining with other bodies, as, for example, the bases of oxides, in the same manner as chlorine and cyanogen do. Considering, then, that this body is combined with one-half of the metallic mercury in the precipitate, while the other half is combined with the chlorine, there will result the bichloride of mercury on the one hand, and the biamidet of mercury on the other, by their union constituting the white precipitate, the formula for which would be

$$HgCl^2 + Hg2NH^2$$

The examination of this formula will afford a very simple explanation of the effects of heat on this compound ; for, if three equivalents are considered to have undergone decomposition, there will be six equivalents of chlorine and six of mercury, to form the chloride of mercury, and twelve equivalents

of hydrogen to combine with four of nitrogen, to form ammonia, while the remainder of the nitrogen comes over in a free state.

If the experiments to ascertain the amount of oxygen in the compound are satisfactory as to its non-existence, then the result of the decomposition, effected by iodide of potassium, will afford additional evidence of the correctness of this formula; for, while the iodine unites with the mercury to form the peroxide, and the chlorine with part of the potassium, the decomposition of water becomes necessary to account for the conversion of the remainder into the free potassa which exists in the solution, and hence will be derived the hydrogen necessary to form the ammonia from the amidogen.

The fact of the absence of oxygen from the compound, has been verified by M. Ullgren,* who has also substantiated the composition of white precipitate, as advanced by Prof. Kane. M. U. is satisfied that when this substance, perfectly dry, is heated gradually to fusion, and then treated with perfectly dry hydrochloric acid gas, no water is formed, but there results a liquid mixture of chloride of mercury and sal ammoniac.

These considerations would seem clearly to point out the existence of nitrogen and hydrogen in this and analogous compounds, but there is yet another view which has been taken, in which part of the nitrogen is supposed to be directly combined with the metal, and the remainder to unite with the hydrogen and constitute one of the elements of the compound under the form of ammonia, or that the amidets are nitrurets combined with ammonia. M. Mellon, who has advanced these views, considers that nitrogen, in ternary combination with a metal, plays the same part as oxygen, sulphur, &c., and forms azo-salts, as the others do oxy-salts, sulpho-salts, &c. This view will certainly explain the composition of these bodies, but with much less simplicity than the theory of the amidets.

* Ann. der Pharm., t. 27.

The action of water on white precipitate affords another compound of chloride and amidet of mercury, but in which the elements vary in their proportion, part being replaced by oxygen; this compound, which is of a canary yellow color, has usually been considered as the peroxide of mercury, arising from the total decomposition of the white powder. But it will be seen, that in composition it is allied to the substance from which it is derived. This is a heavy yellow granular powder, which dries readily, and is very slightly soluble in water; it is not affected by the alkalies. When heated, it yields calomel, metallic mercury, ammonia, azote, and water.

The analysis of this substance was conducted on the same principles as the former, and from the result, Prof. Kane deduces the composition to be

Hg	85.72
Cl	7.48
NH^2	3.42
O	3.38
	100.00

"This yellow powder is generated, evidently, by the reaction of water on white precipitate, in which one-half the chlorine and ammonia are converted into sal-ammoniac, a corresponding portion of the mercury being oxidised."

Prof. Kane was unable to procure the ammoniuret of mercury by the action of alkalies in excess on white precipitate; the result was always the production of the yellow powder above mentioned.

The action which ammonia exercises on calomel is similar to that on corrosive sublimate. When ammonia is added to calomel, a powder is formed, which, when moist, has a black color, but when dry is gray. This powder has been stated to be the black oxide of mercury, but the experiments of Prof. Kane exhibit a different result. This powder is not altered by exposure to air, or to the temperature of 180° F.; boiling water does not affect it; a high temperature decomposes it,

and there is given off calomel, metallic mercury, ammonia, azote, and a trace of water.

The processes for analysing this body were the same as for white precipitate ; it will be sufficient, therefore, to indicate each process and their results without entering into details.

From its mode of preparation was derived the following results :

Hg	88.91
Cl	7.95
Other matters	3.14
	100.00

By protochloride of tin,

Hg	88.18

By hydrochloric acid and sulphuretted hydrogen,

Hg	87.90

By iodide of potassium,

NH^3	3.36

The mean of these experiments give

Hg	88.33
Cl	7.95
NH^3	3.36
Loss, &c.	.36
	100.00

This body then is analogous to white precipitate, the mercury being in proto-combination, and we may construct two formulæ for its composition, according as we consider ammonia or amidogen as one of its elements. The same reasons to guide our choice will apply equally to this body as to white precipitate. Under the former view there will be

$$Cl.Hg+HgO.NH^3$$

Under the latter,

$$Cl.Hg+HgNH^2$$

Calomel, by the action of ammonia, should yield 97.84 per cent. of the product, having the former composition, while it should give but 95.95 per cent. of the latter. The experimental results on this point favor the latter view, as 100 parts of calomel yielded 95.72 as an average of two trials.

Other mercurial compounds, as the peroxide, sulphate, nitrate, &c., have been examined with regard to the action of ammonia, and the nature of resulting compounds, and, in many of them, there has been found reason to suppose that amidogen enters as a constituent. In like manner the salts of silver, copper, and zinc have also been embraced in this examination, and the following are some of the conclusions at which Prof. Kane arrives:

Ammonia is an amidet of hydrogen, and should have the following formula.

$$NH^2.H$$

Amidogen may combine with metals, and the metallic amidets have a singular tendency to combine with chlorides and oxide of the same metals, of which the mercurial and cupreous salts afford some remarkable examples.

It may be proper to state (on the authority of Fauché and Soubeiran,* the original not being accessible) that Prof. Kane considers the precipitate of Wohler, (the white precipitate of most of the Pharmacopœias,) prepared by the action of carbonate of potassa, on mixed solutions of sal-ammonia and corrosive sublimate not to be identical in composition with that formed from corrosive sublimate by ammomia, but that it may be considered as formed of one atom of ammonia, and one atom of corrosive sublimate. Its formula would then be

$$HgCl^2+NH^3$$

He also, states that it may be formed by boiling white precipitate in water of ammonia. R. B.

* Journ. de Pharm. Jan. 1840.

ART. XVII.—DESCRIPTION AND ANALYSIS OF A MINERAL A SALINE INCRUSTATION, AND A BARK, BROUGHT FROM THE COUNTRY LYING BETWEEN SANTA FE, AND THE HEAD WATERS OF THE ARKANSAS RIVER.

By WILLIAM PROCTER, JR.

THE three substances which form the subjects of this essay were brought to this city by J. Gregg, an intelligent gentleman who trades with Santa Fé, in Mexico. The specimens severally were accompanied by an outline of their locality, etc., which has been inserted previous to each description.*

It would add greatly to our knowledge of the productions and resources of that section of country, as well as of other parts of the far west, if the same interest was manifested by all those who are engaged in the western trade beyond the Mississippi.

The following remarks were attached to the mineral, viz:

"This mineral is found in inexhaustible quantities on both sides of the Canadian fork of the Arkansas river, about three hundred miles above its junction with the latter. I have seen several huge solid rocks of it, containing several thousands of cubic feet each; and, indeed, along the waters of the Canadian, for many miles, there is no other rock. The hills are covered, the vallies are strewed, and the rivulets are lined with it. It occurs of various qualities from the coarse appearance of ordinary plaster of Paris, to the glittering gypsum (selenite.) The latter is found, composed of thin laminæ, which may be slit into sheets.

The same quality, found in the vicinity of Santa Fé, is used for window panes; and the coarser article (also found there,) burnt, makes a beautiful white-wash, which is also used by the Mexicans."

* It is due to Alexander Fullerton, Jr., druggist of this city, to state that it was through his instrumentality that the substances above treated of were obtained from his friend J. Gregg.

Description.—The mineral varied in aspect, in different pieces; most of it was white, with a slight tint of red, of a granular texture, appearing through the glass, a mass of glittering grains, without taste, yielding to the finger nail, and, in short, had all the appearances of the *granular gypsum* of mineralogists. Other portions had a stratified, somewhat crystalline texture, and a grayish white clouded color. The specific gravity of the former was 2.233, that of the latter was 2.222.

Analysis.—One drachm of the mineral was boiled with six ounces of water, acidulated with sulphuric acid, until twenty-six grains had been dissolved, and the liquor filtered while hot. To the hot filtered solution, oxalate of ammonia was added, until a precipitate ceased to be produced. This precipitate, when collected, washed and dried, weighed twenty grains, and was then heated to redness. The resulting powder dissolved readily in nitric acid with effervescence, and possessed the characters of carbonate of lime.

Twenty grains of oxalate of lime is equivalent to 8.8 of lime which, united with one equivalent of sulphuric acid, makes 21.1 grains of anhydrous sulphate of lime, which is very near the quantity that exists in twenty-six grains of the hydrous sulphate.

A portion of the mineral was boiled in water (which dissolved a small quantity,) and the solution filtered. When chloride of barium was added, a dense precipitate resulted, which had the characters of sulphate of baryta, and consequently proving the existence of sulphuric acid in the mineral.

To render the evidence in favor of the mineral being sulphate of lime, a portion of it was powdered and calcined, by which operation it lost weight and bulk, and acquired the property of solidifying by the addition of a proper quantum of water, peculiar to the sulphate of lime, or plaster of Paris.

Hence there can be little doubt that the mineral is granular gypsum. Existing in such vast quantities as has been represented, this mineral production will doubtless at some future

period be of immense advantage to that portion of the country in an agricultural point of view.

THE SALT.

The following observations accompanied the saline matter, viz.: "This species of salt was taken from a pond, near *El Paso del Norte,* in the department of Chihuahua. This pond spreads over two or three acres of ground. During the wet season the water only is strongly impregnated with the salt; but when dry weather comes on, it crystallizes on the surface of the water, and presents the appearance of a pond of limpid ice. When a hatchet is struck into it, it chips out with about the same facility and brittleness as that substance. In some parts of the pond it is found crystallized to the depth of five or six inches. I have heard it said that the natives sometimes use it as a purgative. Many of these ponds or lakes occur on the route to the Rocky Mountains, but none of them are so highly impregnated with the salt as the one from which the specimen was obtained."

Description.—The specimen, as presented to view, was a white powder, having all the appearance of an effloresced salt; a saline disagreeable taste, without odor, and completely and readily soluble in water, except about one per cent. of impurities.

When the solution is evaporated till a pellicle forms, it becomes nearly a solid mass of prismatic crystals by cooling. When the mother waters are suffered to drain off, and evaporated, more crystals are obtained.

Twenty-eight grains of the crystallized salt was subjected to a gentle heat, until deprived of its water of crystallization, and yielded 12.5 grains of anhydrous salt. This was dissolved in water and treated with solution of chloride of barium, until a precipitate ceased to be produced. This precipitate, when collected on a filter, washed till the water that passed remained unaffected by nitrate of silver, dried and weighed, amounted

to twenty grains. The *sulphuric acid* thus separated amounts to 6.86 grains.

It hence follows that the sâlt is a *sulphate*, and it remained to ascertain the base.

Chloride of platinum had no effect upon a concentrated solution of the salt, and consequently the base is nòt potassa.

When a strong solution of potassa was added to the solution, no ammoniacal odor was emitted.

When a small portion of the salt is held in the outer flame of the blow-pipe, it communicates a deep yellow hue to the flame, which is characteristic of soda ; hence the salt must be *sulphate of soda.*

If a sulphate of soda, 6.86 grains of sulphuric acid, require 5.38 grains of soda for saturation, then $6.86+5.38=12.24$ grs. of sulphate of soda, while the amount of salt employed was 12.5. Sixty grains of the impure anhydrous salt was dissolved in water and filtered, to separate the impurities. By treating the solution with oxalate of ammonia, about one per cent. of oxalate of lime was obtained, equal to about .044 of lime.

The mother waters remaining after crystallizing the sulphate of soda, were suffered to evaporate to one-fifth, and the remainig fluid allowed to drain off. The crystalline matter which resulted consisted of sulphate of soda, interspersed with small cubic crystals. A number of the cubes were separated.

When the cubic salt was added to a drop of concentrated sulphuric acid, and a glass rod moistened with ammonia held over it, copious white vapors resulted.

Another portion was dissolved in water, nitrate of baryta added to separate any adhering sulphate, and the liquor filtered. When nitrate of silver was added to the solution, a white precipitate resulted which was soluble in ammonia. The crystals also decrepitate by heat, and tinge flame yellow, and are hence *chloride of sodium.*

The liquid drained off in the last experiment was mixed with alcohol, and nitrate of baryta added to get rid of the sulphuric acid—of the sulphate, then filtered and evaporated to dryness—the dry mass digested in alcohol, and the solution

filtered and evaporated to dryness. The resulting saline matter was redissolved in water, and divided into two portions; to one, nitrate of silver, and to the other, oxalate of ammonia was added, producing in both cases bulky white precipitates, evidencing in the first case the existence of *hydrochloric acid*, and in the other *lime*. Hence the salt is a *chloride of calcium* or hydrochlorate of lime in solution.

In conclusion, the saline matter, as obtained from the natural locality, consisted of about ninety-seven per cent. of sulphate of soda, two per cent. of the chlorides of calcium and sodium, and one per cent. of impurities.

THE BARK.

It now remains for us to examine the bark, previous to which, however, let our friend speak for himself, as to its locality, etc. "The tree which yields the bark is called by the Mexicans, *alamo*, (this name, however, which means poplar, is applied by them to every species of cottonwood,) and by Americans, *mountain* or *willow-leaved* cottonwood. It resembles the Mississippi cottonwood, in the external appearance of the bark and the internal qualities of the wood; but the leaf is long and slender like that of the common willow; thus, in this respect, differing materially from the Mississippi tree. The flower I do not recollect, but it produces a cotton similar to that of the common cottonwood. The bark is said to possess, in a *high degree*, the qualities of the Peruvian bark. Its growth seems confined to the vicinity of water, being found only on the border of rivulets, and the ravines of the mountains. I have seen it no where but in the mountains of Santa Fé, but it most probably extends through all that spur of the Rocky Mountains. I have seen the trees as large as two or three feet in diameter."

Description.—The bark, as presented, was in pieces five or six inches long, of a light yellow color, and was evidently the inner bark. It possessed a very considerable bitterness, with an after taste which reminds one of the common poplar.

Analysis.—An ounce of the bark was boiled in half a pint of water for an hour. To the decoction thus formed, subacetate of lead was added, until it ceased to cause a precipitate, and the liquor separated by a filter. This was then boiled with an excess of chalk, to precipitate the oxide of lead, and the liquor again separated by filtration. It was then evaporated to one-tenth and allowed to remain at rest. Numerous crystals were gradually deposited as the liquor concentrated by spontaneous evaporation. These were redissolved in water and boiled with purified animal charcoal, the solution filtered, and again evaporated and crystallized. The substance thus obtained was white, had a very bitter and peculiar taste, crystallized in flattened rectangular prisms, soluble in water and alcohol, much more so by heat, but insoluble in ether. When put in contact with concentrated sulphuric acid, it is immediately turned red, which color it communicates to the acid. It is neutral to litmus paper.

The mother water was treated with carbonate of potassa, and the precipitate thus formed, by boiling water, and the water partially evaporated, suffered to cool, but no evidence of populin was obtained. The precipitate was carbonate of lime, resulting from the decomposition of the acetate of lime, by the carbonate of potassa.

When the crystalline matter above mentioned was treated with oxalate of ammonia, no evidence of lime was manifested. These properties are evidently those of salicin, as mentioned by Leroux, its discoverer; and this principle has already been found in the bark of the *Populus tremulus*, of Europe, by Braconnot. Captain Bonneville says the *bitter cottonwood* and *willow* grow promiscuously on the Rocky Mountains. (Irving's Rocky Mountains.) May not the bark under consideration be the product of a species of *salix?* It has been ascertained that the bark of several species of that genus contain salicin, but no populin, which is the case with that which forms the subject of these remarks.

As has been said, subacetate of lead causes a copious precipitate.

By adding a solution of gelatin to the decoction, a precipitate was obtained, having the characters of tanno-gelatin.

Persulphate of iron causes a dark greenish blue precipitate with the decoction.

Tincture of iodine has no effect on the decoction.

A portion of the bark was macerated in alcohol 36°, for three days. The tincture thus formed, when added to water, caused no precipitate or cloudiness.

To the bark remaining after the alcoholic maceration, ether was added, and permitted to stand two days. The ethereal liquor, when evaporated, yielded a small portion of fixed oil of a deep yellow color. When the alcoholic extract is treated with ether, and the ether evaporated, a small quantity of the same fixed oil is obtained, proving the solubility of this oil in alcohol. From the foregoing observations we may infer that this bark contains salicin, tannin, gum, and fixed oil. Its power as a febrifuge is undoubtedly due to *salicin*, of which it contains about two per cent.

ART. XVIII.—NOTICE FROM DR. ROBERT HARE, PROFESSOR OF CHEMISTRY, &c., RESPECTING A NEW LIQUID HYPONITROUS ETHER, AND AN ETHEREAL GAS: ALSO A SERIES OF GASEOUS COMPOUNDS FORMED WITH THE ELEMENTS OF WATER, WHEN IN THE ACT OF COMBINING EXPLOSIVELY.

When nitric acid or sulphuric acid with a nitrate is employed to generate ether, there must be an excess of two atoms of oxygen for each atom of the hyponitrous acid which enters into combination. This excess involves not only the consumption of a large proportion of alcohol, but also gives rise to several acids, and to some impurities.

It occurred to me that for the production of pure hyponitrous ether, a hyponitrite should be used. The result has fully realized my expectations.

By subjecting hyponitrite of potassa or soda* to alcohol and diluted sulphuric acid, I have obtained a species of ether which differs from that usually known as nitrous or nitric ether in being sweeter to the taste, more bland to the smell, and more volatile. It boils below 65° of F., and produces by its spontaneous evaporation a temperature of 15° F. On contact with the finger or tongue, it hisses as water does with red hot iron. After being made to boil, if allowed to stand for some time at a temperature below its boiling point, ebullition may be renewed in it apparently at a temperature lower than that at which it had ceased. Possibly this apparent ebullition arises from the partial resolution of the liquid into an aeriform ethereal fluid, which escapes, both during the distillation of the liquid ether, and after it has ceased, even at a temperature

* The hyponitrites of potash and soda which were employed in the process above mentioned, were extricated from the saline mass which remains after heating a nitrate of either of those bases, to obtain oxygen, so long as this gas does not contain more than three per cent. of impurity. This residual mass has been found, to Dr. Hare's surprise, to consist of about two-thirds nitrate and one-third of hyponitrite. This latter being more soluble, may be separated by crystallization.

below freezing. This aeriform product has been found partially condensible by pressure, into a yellow liquid, the vapor of which, when allowed to enter the mouth or nose, produced an impression like that of the liquid ether. I conjecture that it consists of nitric oxide, so united to a portion of the ether as to prevent the wonted reaction of this gas with atmospheric oxygen. Hence it does not produce red fumes on being mingled with air.

Towards the end of the ordinary process for the evolution of the sweet spirits of nitre, a volatile acrid liquid is created, which affects the eyes and nose like mustard, or horse radish.

When the new ether as it first condenses is distilled from quick lime, this earth becomes imbued with an essential oil which it yields to hydric ether, when aided by the presence of water. This oil may be afterwards isolated by the spontaneous evaporation of its solvent. It has a mixed odor, partly agreeable, partly unpleasant. From the affinity between its odor and that of common nitrous ether, I infer that it is one of the impurities which exist in that compound.

The new ether is obtained in the highest degree of purity, though in less quantity, by introducing the materials into a strong well ground stoppered bottle, refrigerated by snow and salt.* After some time the ether will form a supernatant stratum, which may be separated by decantation.

* The following is the proportion in which the materials may be employed :

Sulphuric acid 7 ounces 332 grains avoirdupois.
Water same bulk as the acid.
Alcohol 3 ounces 234 grains.
Hyponitrite of soda 14 ounces 204 grains.

When the distillatory process is resorted to, the alcohol and salt is first introduced, the diluted acid being gradually poured into the retort by means of a tapering glass tube passing through the tubulure, to which it is luted. The lower orifice of the tube descends below the surface of the alcohol. The more volatile portion of the ether comes over without heat; a considerable portion may afterwards be distilled by raising the temperature by a water-bath. The ether thus obtained should be redistilled from powdered quick lime.

Any acid, having a stronger affinity for the alkaline base than the hyponitrous acid, will answer to generate this ether. Acetic acid not only extricates, but appears to combine with it, forming apparently a hyponitro-acetic ether.

I observed some years ago that when olefiant gas is inflamed with an inadequate supply of oxygen, carbon is deposited, while the resulting gas occupies double the space of the mixture before explosion. Of this I conceive I have discovered the explanation. By a great number of experiments, perforemd with the aid of my barometer gage Eudiometer, I have ascertained that if during the explosion of the gaseous elements of water any gaseous or volatile inflammable matter be present, instead of condensing there will be a permanent gas formed by the union of the nascent water with the inflammable matter. Thus two volumes of oxygen, with four of hydrogen, and one of olefiant gas, gave six volumes of permanent gas, which burns and smells like light carburetted hydrogen. The same quantity of the pure hydrogen and oxygen with half a volume of hydric ether, gives on the average the same residue. One volume of the new hyponitrous ether under like circumstances produced five volumes of gas.

An analogous product is obtained when the same aqueous elements are inflamed in the presence of an essential oil. With oil of turpentine a gas was obtained weighing per hundred cubic inches $16\frac{5}{10}$ grains, which is nearly the gravity of light carburetted hydrogen. The gas obtained from olefiant gas, or from ether, weighed on the average, per the same bulk, $13\frac{5}{10}$ grains. The olefiant gas which I used weighed per hundred cubic inches only $30\frac{5}{10}$ grains. Of course if, per se, expanded into six volumes, it could have weighed only one-sixth of that weight, or little over five grains per hundred cubic inches. There can therefore be no doubt that the gas obtained by the means in question, is chiefly constituted of water, or of its elements in the same proportion of two volumes of hydrogen to one of oxygen.

With a volume of the new ether, six volumes of the mixture of hydrogen and oxygen give on the average about five

residual volumes. The gas created in either of the modes above mentioned does not contain carbonic acid, and when generated from olefiant gas, appears by analysis to yield the same quantity of carbon and hydrogen as that gas affords before expansion.

These facts point out a source of error in experiments for analyzing gaseous mixtures by ignition with oxygen or hydrogen, in which the consequent condensation is appealed to as a basis for an estimate. It appears that the resulting water may form new products with certain volatilizable substances which may be present.

ART. XIX.—ON THE USE OF LACTATE OF IRON.

By MM. Gelis and Conté.

(*Report made on this paper to the Academy of Medicine, by MM. Fouquier, Bally and Bouillaud.*

The Academy of Medicine, at its meeting on the 4th of February last, received a report from MM. Bally, Fouquier and Bouillaud upon a paper of MM. Gelis and Conté, having for its subject the Lactate of Iron, and its properties as a therapeutic agent ; we propose to present here an account of this paper and the report upon it.

MM. Gelis and Conté first pass in review the ferruginous preparations employed in medicine ; there are none, in their opinion, even among the most recent and best accredited, but leave much to be desired. The lactate of the protoxide of iron appears to them to possess a superiority over every other preparation, and this they endeavor to establish by the following considerations :

All modern authors who have attended to the ferruginous preparations, and the forms under which they can be administered, propose for their object to present the iron in such a

state that it may readily be attacked by the acids of the gastric juice. But the labors of MM. Berzelius, Tiedman and Gemelin, Dumas, Leuret, and Lassaigne, have shown that the gastric juice contains lactic acid in so great a proportion, that to its presence may be attributed the very energetic solvant property of this juice, which does not appear to contain anything else except traces of hydrochloric acid. It is then to the formation of lactate of iron in the stomach that the efficacy of the ferruginous preparations are due.

MM. Gelis and Conté cite, in support of this assertion, the results of several experiments, which they have made for the purpose of testing the action of the lactic acid upon some of the ferruginous preparations most employed. They perceive, that among these preparations, those which dissolve most readily in this acid are precisely the most active. They hence regard it as probable that the iron taken into the stomach is changed into lactate of iron, and only acts after being combined with lactic acid. This theory gives rise to the idea of administering the lactate of iron ready formed. With this new remedy, the action of the stomach is reduced to the simple process of absorption, and the effect of the remedy no longer depends upon the greater or less acidity of the gastric juice.

Nevertheless, however well founded these presumptions appear, they cannot be admitted with confidence until they have been verified by clinical practice.

MM. Fouquier, Bally, Bean, Rayer, Nonat, and Bouillaud have experimented with the lactate of protoxide of iron, and have collected a large number of observations on chlorosis treated with success by this new medicine.

MM. Gelis and Conté prepare the lactate of iron by treating pure iron filings with lactic acid diluted with water ; they then introduce it into lozenges in which the sugar prevents the super oxidation of the iron, and preserves the medicine at the same time that it gives a facility of administration. Each lozenge contains seven or eight centigrammes of lactate of iron ; four, six, or even ten may be given during the twenty-four

hours to each patient, who should continue their use for eight or fifteen days.

Each chlorotic patient treated by M. Bouillaud had used for the re-establishment of health, as an average, about six to eight grammes of lactate of iron. All had perfectly borne its use. A remarkable augmentation of the appetite was one of the first effects perceived.

M. Bouillaud, depending on the results of the trials of his colleagues and his own observation, terminates his report by concluding that clinical research permits us, for the present, to rank the lactate of iron as among the most useful of the ferruginous preparations. F. B.

Jour. de Phar.

ART. XX.—PROCESS FOR THE PREPARATION OF THE LACTATE OF PROTOXIDE OF IRON. By M. LOURADOUR, Pharmacien.

M. LOURADOUR extracts the lactic acid from the whey which he collects from the dairies in the neighborhood of Paris, where much cheese is made. This whey, exposed a long time to fermentation under the influence of an elevated temperature, becomes charged with a large quantity of lactic acid. It is evaporated to one-third or one-fourth of its volume, decanted and filtered ; and is then saturated with milk of lime, which produces an abundant deposit chiefly of phosphate of lime. The filtered solution is precipitated by oxalic acid, and again filtered, and then concentrated to a syrupy consistence. It is now diluted with alcohol, which precipitates the lactine and the salts. The solution on being filtered and the alcohol distilled off, yields pure lactic acid. The lactate of the protoxide of iron is prepared by digesting on a sand bath, at a low temperature, this acid diluted with water upon iron filings. At

the end of six or seven hours of the reaction, the liquid is boiled, filtered and concentrated, when, on cooling it deposits crystals. These crystals drained in a funnel and washed with alcohol, by displacement, should be rapidly dried and enclosed from any contact with the air.

This salt, such as M. Louradour has shown us, and such as we have ourselves obtained by following his process, which is economical and easy of execution, presents itself under the form of crystalline plates, very white, and but slightly alterable. It is but sparely soluble in water, reddens litmus paper, and possesses the ferruginous taste in a tolerable degree ; when dissolved in water it attracts oxygen and quickly becomes yellow.

The sparing solubility of lactate of iron has allowed M. Louradour to simplify even more his process, by suppressing the purification of the lactic acid by alcohol, and treating it immediately by the iron filings ; the liquor suitably evaporated, affords crystals of the lactate ; the foreign salts and the lactine remain in the mother waters, which are rejected. F. B.

Journ. de Pharm.

ART. XXI.—OBSERVATIONS ON THE SUPPOSED FORMATION OF INORGANIC ELEMENTS DURING FERMENTATION. By J. DENHAM SMITH.

IN the October number of the last year's Philosophical Magazine, (vol. xv. p. 329,) there appeared an abstract of various papers read at the meetings of the Royal Society, one of which, entitled "Additional Experiments on the Formation of Alkaline and Earthy Bodies by Chemical Action when Carbonic acid is present, by Robert Rigg, Esq. F. R. S.," attracted my notice, from the novel and most extraordinary nature of the results announced in it.

Although the Royal Society has always carefully disclaimed any participation in, or support of, the theories and observations brought before the public or published by it, yet the circumstance of a paper being read to the first learned society of these kingdoms, and the author of the paper a fellow of the society, gives weight and sanction to the observations adduced. This circumstance was one of the chief reasons which led me to make the following experiments on the subject of this novel formation of inorganic elements by catalytic action.

I much regret that in the abstract of the paper which appeared in this Magazine, no details of any of the experiments were given ; the substances used, the apparatus and the results obtained, only being mentioned. It appears that "the author gives a detailed account of several experiments in which sugar, water, and yeast only were employed, and from which he deduces the conclusion that alkaline and earthy matters are formed by chemical action. In one set of experiments, some of which were made in silver, others in china, and others in glass apparatus, after the vinous fermentation had gone on during five days, the quantity of ashes obtained was, in the silver apparatus, eighteen, in the china nineteen, and in the glass fifteen times greater than the previous quantity. A further examination of these ashes showed that they consisted of po-

tash, soda, lime, and a residue not acted upon by muriatic acid."

Thus having no data of the respective quantities of sugar, water, and yeast, Mr. Rigg used, I may not have employed these substances in the proportions with which he experimented; if this should be the case, I presume, however, that this circumstance will not in any way tend to vitiate the results I have obtained, the question being whether inorganic matter is produced during vinous fermentation.

To satisfy myself respecting the correctness of Mr. Rigg's statement that the quantity of inorganic matter in a liquid is increased from fifteen to nineteen times when carbonic acid is present, I dissolved 1500 grains of the best refined sugar in one and a half pints of distilled water, and added 200 grains of risen beer yeast, then thoroughly mixed them by agitation. This solution was passed through fine cambric to separate any insoluble impurities which the solution contained, and divided into three exactly equal portions. Of these, two portions were respectively placed in German glass jars, and immediately covered with unglazed paper covers; the paper was of a close texture and carefully gummed down round the exterior of the jars, to prevent any inorganic matter, as dust, &c., from getting into the solutions. These jars were placed in a warm situation in the laboratory, the temperature varying from 60° to 70° F., and the fermentation allowed to proceed. The third portion was then put into a flask and boiled, occasionally adding pure nitric acid; this acid left no stain when a portion was evaporated to dryness in a porcelain capsule; the flask was kept in an oblique position, to prevent any of the liquid being ejected by the action of the nitric acid. During the ebullition of the liquid, nitrous acid fumes were slowly formed, and the liquid assumed a primrose yellow color; numerous spherules of liquid were formed, and coursed hither and thither with great velocity, the larger spherules seemingly attracting the smaller; and when by this union the globule had attained about the size of a coriander seed, it disappeared, being again united to the bulk of the boiling solution. I imagine that this

singular and interesting phenomena is owing to small portions of the liquid being ejected from its bulk by the rapid action of the nitric acid on the organic matter in the liquid; and that these particles on again approaching the surface of the fluid, there meet with a stratum of nitrous oxide gas, or of this gas mixed with steam, which prevents their contact with the subjacent liquid, and upon which stratum they float, until by the increase of size, and consequently of weight, the buoyant power of this stratum of gas or vapor is insufficient to prevent their coming in contact with the mass of the liquid, and that they then reunite with it, disappearing instantaneously.

Oxalic acid was formed and then decomposed by the continued action of the nitric acid; and the residue of the liquid after evaporating to dryness in a platinum crucible weighing 630.4 grains, was ignited to redness in a gas furnace, with the occasional addition of a few drops of nitric acid; an ash of a light buff color remained, weighing, with the crucible, 631.97 grains,—630.4=1.57 grains of inorganic matter contained in 500 grains of sugar and 66.6 grains of yeast before fermentation. On examination, this ash was found to consist of an alkaline carbonate, traces of a chloride and a sulphate, phosphates of lime and magnesia in large proportions, and minute traces of silica and oxide of iron.

At the expiration of six days, one of the portions which had undergone vinous fermentation, and which presented the agreeable odor accompanying this stage of fermentation, was evaporated in a mode and with precautions exactly similar to the above, and the same phenomena were observed during the operation. The residual liquid evaporated to dryness in the platinum crucible weighing 630.38 grains, and ignited over a gas lamp to full redness, as in the first experiment, afforded an ash similar in appearance to the former, which, with the crucible, weighed 631.97 grains,—630.38=1.59 grains of inorganic matter, yielded by 500 grains of sugar and 66.6 grains of yeast, after undergoing the vinous fermentation. This ash was similarly constituted with that obtained in the first instance.

From these experiments we find that whilst 500 grains of sugar, and 66.6 grains of yeast, afford, previous to fermentation, 1.57 grains of inorganic matter; when fermented they give 1.59 grains, an increase of one-fiftieth of a grain, or about one and a quarter per cent., an increase so trifling that I do not hesitate to refer it to an error of experiment, and not to the formation of inorganic elements during vinous fermentation, which Mr. Rigg asserts is the case. I therefore conclude, contrary to the views entertained by Mr. Rigg on this subject, that there is no formation of inorganic matter during the progress of vinous fermentation.

I am at a loss to offer any feasible explanation of the enormous increase of inorganic matter observed by Mr. Rigg, the only mode by which this could have taken place, which at present occurs to me, and that an unlikely one, is that sufficient precautions were not taken to prevent the introduction of foreign matters by securely covering the solutions of sugar and yeast while fermenting; and that a quantity of dust, the constant plague of a laboratory, became mixed with his solutions, and thus led Mr. Rigg to suppose that the alkalies and earths were really formed during fermentation. I may remark that the paper covers with which my fermenting solutions were protected from dust, were so thickly covered with it, that, had the precaution of covering the solutions not been taken, I must have obtained a very considerable increase in the weight of the ash after fermentation, although I do not imagine that it would have been to the extent of fifteen or nineteen times the weight of the ash previous to it.

Lond. and Edin. Phil. Mag.

ART. XXII.—MEMOIR UPON THE ORIGIN AND DISTINCTIVE CHARACTERS OF THE TURPENTINES. By M. GUIBOURT, Professor in the School of Pharmacy.

(CONCLUDED.)

*Of the Turpentine of the Fir, called Venice Turpentine, Alsace Turpentine, Citron Turpentine, and formerly Bigeon.**

I THINK that it would be a useless undertaking to present a continuous historic account of the long confusion which has existed between the fir or *abies* of the Latins, and that species of fir called *picea*. Jean Bauhin is the first who gave an exact and particular description of each of them, and who completely distinguished between them. After him, Linnæus ran the risk of again confounding them, by giving to the first the name of *Pinus picea*, and, to the last, that of *Pinus abies*. At present these two trees belong to the genus Abies, and are named, the first, *Abies taxifolia* ; the second, *Abies excelsa*.

The fir or *avet* (a name derived from the Italian *abeto*, itself coming from *abies*,) grows in a pyramidal form 100 to 130 feet in height ; its branches are arranged in regular whorls, and extend horizontally. Its leaves are sparse upon the young branches, but compressed and directed in two opposite rows, which gives to them the appearance of the foliage of the yew, or the teeth of a comb : hence, the names of *Abies taxifolia*, Desf., or *pectinata*, D. C. These leaves are linear, flat, coriacious, obtuse, or emarginate. They are shining, of a deep green above, whitish beneath, (with the exception of the green median line,) which has given a resemblance to the tree known by the name of *silver fir*. The male flowers form isolated catkins in the axils of the leaves, and are disposed in great number near the extremity of the branches. The female flowers

* Bigeon is the French abreviation for *abiegna* or *abietina*.

form catkins almost cylindrical, disposed to the number of two or three, not at the extremity of the branches, but generally at their last division. These catkins are directed upwards, and preserve this position in becoming elongated ovoid cones, formed of flat scales, which are rounded, serrated, and imbricate. Each scale is provided upon its back with a bract, terminating in an acute point, which appears on the outside of the cone. The seeds are pretty large, and surrounded with a membranous wing.

The fir grows upon all the high mountains of Europe, and principally upon the Alps of Tyrol, of Valais, of Dauphiny ; in the Cevennes, the Vosges, Jura, the Black Forest ; in Sweden and Russia.

The *epicia* (*Abies excelsa*) attains nearly one hundred and fifty feet in height ; it is the most elevated of the trees in Europe ; its branches are arranged in whorls less regular than those of the preceding ; its leaves are linear, *quadrangular, pointed*, inserted all round the branches. The female flowers form small *solitary* catkins *at the extremity of the branches*, and the cones, when grown, depress, by their weight, the extremity of the branches, and hang downwards. These cones are four or six inches long, cylindrical, formed of flat scales, sulcated at the summit, and destitute of bracts.

This tree, unlike the first, can lose its terminal summit, without interfering with its increase of height. When in Savoy last autumn, I observed, with respect to this, a singular fact. There exists upon the side of Montmelian, on the other side of the Iser, at a place called Blondet, a wood of the epicia, which presented to me, at first close upon the road, an elevated tree, having two straight stems running almost perpendicularly side by side, for separated as they were at the origin of the branches, there was not between them an angle of three or four degrees. This fact surpised me more when, looking into the forest, I saw a considerable number of trees, apparently of the same age, and provided with two similar trunks. At last I found the explanation in a young fir, the trunk of which was broken at the height of six or seven feet. Of seven branches

which composed the highest whorl, two which were little developed had preserved their horizontal position; two others had extended themselves at an angle of about ten degrees; a fifth, at twenty degrees; finally, the two last, the most vigorous, had straightened themselves, so as to approach the perpendicular. Between them could be perceived the broken trunk; but it was evident that as the new stems increased in diameter, marks of the broken trunk became obliterated, and it then appeared as if the stem below bifurcated naturally.*

These species differ as much from the nature and position of the resinous juices as from their botanical characters. The first, as has been seen, furnishes a clear transparent liquid resin, which is formed in little bladders formed upon the bark of the young branches; and, if incisions are made in the bark, so little turpentine flows out, according to Duhamel, as to merit no attention.† The second, on the contrary, presents very few vesicles upon the bark, but if notches are made into it, there will flow, between the wood and the bark, an abundance of opaque thick juice, which soon solidifies by contact with the air, and never runs to the ground. This resin, when detached from the trunk with a scraper, melted with water in a boiler and strained, constitutes the true *yellow pitch*, or *Burgundy pitch.*

All these facts are known, in the books at least, and I have already avowed that I have no pretension to novelties; but since many persons still attribute the turpentine of the fir to

* I presume that it was in 1813, at the time of the defence of the fort of Montmelian, attacked by the Austrians encamped at Bondet, that the fracture of so many trees occurred.

† I have supposed, erroneously, (in the *Historie des Drogues*, tom. ii, p. 577,) that the fir produces two species of turpentine, one a clear transparent liquid, having a citron odor, obtained in the Vosges by puncturing the vesicles of the bark; the other thicker, more colored, of an oppressive odor, very acrid and bitter, collected in great quantity in Germany and other countries, by making incisions into the trunk. I have been led into error by the name of Strasburg Turpentine, which this last turpentine generally bears. As I have said before, it comes principally from Sweden, and is derived from the larch.

the larch and reciprocally,—and since the greatest number, I believe, at least, are not acquainted with the *Burgundy pitch*, which is a production of our own country, it was necessary to procure specimens from the trees themselves. What I did with respect to the resin of the larch, I also was desirous of accomplishing with respect to the firs ; and having found in the Commercial Calendar that the commune of Gerardmer, in the department of Vosges, produced a good deal of white pitch, I wrote to M. Choulette, a pharmacien, without personal knowledge of him, but persuaded that I should not appeal in vain to the spirit of fraternity and the love of science which animates French pharmaciens. M. Choulette, a well informed botanist besides, had left Gerardmer for Strasbourg, but having kept up his relations in the country, immediately complied with my desire, and on the 6th of September, 1838, sent me specimens of the resinous products of the Vosges,—consisting of the turpententine of the A. *taxifolia*, the rough and the purified pitch of the A. *excelsa*, and the black pitch of the wild pine, accompanied with branches and fruit of the trees from which these products had been obtained, and the information which follows :—

"The forests of Vosges," says M. Choulette, "are filled with the *Abies taxifolia ;* this species is the most numerous. The A. *excelsa* is also frequently met with. The first, in patois, is called *sep*, the second *fie*. There also exist different species of pines, but arising from artificial dissemination. The propagation of the first is accomplished sometimes artificially, but it is infinitely better when it is accomplished naturally. A north exposure appears to be the most favorable.

"The turpentine is collected upon the common fir. The larch, which is also met with frequently in the Vosges, equally furnishes it. But the administration does not permit its collection either upon one or the other, at least by means of gashes made in the trunk, because this operation is injurious to the subject of it, and may cause it to perish. In fact, the turpentine may be extracted from the fir by merely rupturing the vesicles of the bark ; but this is so little practised in

the Vosges, that during my residence in the country, I obtained from a distance nearly all that I employed. In return, however, the little that I could procure upon these localities, rivalled the handsomest afforded by commerce. The trade in white pitch, in spite of the restrictions placed upon it by the administration, is more general. It is derived from the A. *excelsa* by the method which you have indicated. It is enclosed in fir boxes, made in the country, and exported under the name of *pitch*, but the inhabitants are not aware that it is their own which is sold under the name of *Burgundy pitch*. It is principally in Loraine and Alsace that this exportation occurs.

"The black pitch which I send you has been made at Ronges Eaux, near Bruyères, by the following mode: The wood of the trunk of the tree, *Pinus sylvestris*, is cut into billets four or five feet long, placed in heaps upon a stone foundation, burnt with a smothered fire, and collected in boxes of fir wood. It is also obtained from the branches of the tree, but principally from the trunk."

The turpentine of the fir which was sent to me by M. Choulette, is almost as liquid as olive oil, which very well justifies the name of oil of fir, given to it in Italy. It is opaque and whitish, although the resinous juice in the vesicles is perfectly transparent, but it can be readily understood that the moisture of the torn portions of the bark becomes mixed with the resin and produces this opacity. When the resin is purified by filtering in the air and sun, or perhaps also by long standing, this moisture disappears, and the resin then forms a liquid a little more consistent, transparent, and hardly colored. Its odor is sweet, similar to the citron; its taste is moderately acrid and bitter, so that Mathiolas and others are wrong in attributing greater bitterness to the turpentine of the fir than to that of the larch; it is certainly the contrary which holds.

The turpentine of the fir, when recent, is almost as turbid and liquid as that of the *Balm of Mecca*, but independently of the odor peculiar to each, which distinguishes them, they are not affected in the same manner by water. When a drop

of the balsam of Mecca is allowed to fall upon a glass of water, the balsam extends itself instantaneously and completely over the whole surface of the liquid, in a thin and nebulous layer. By waiting a few moments to allow the volatile oil to evaporate, the resin becomes so solid that by touching it with a pin, it can be removed in a consistent mass. When a drop of the turpentine of the fir is allowed to fall upon a glass of water, it precipitates to the bottom at once, then returns to the surface, retaining the form of a well defined globule. Yet if the surface of the liquid be carefully examined, it will be found covered with a thin pellicle, presenting all the colors of the rainbow ; so that the contraction of the drop of resin appears to be owing to the layer of volatile oil which is produced immediately upon the surface of the water, but by little and little the drop spreads itself unequally, and pushes the irridescent layer to different points of the surface. Both parts are then equally resplendent by reflection. Lastly, inspected after a few minutes, the resin, as in the *Balsam of Mecca*, is sufficiently solid to be removed in an entire piece with a pin.

This mode of treatment indicates great volatility in the volatile oil of the turpentine of fir ; and, in fact, when kept in a vessel not hermetically sealed, it is not long in forming a solid pellicle upon its surface, which is not the case with the turpentine of the larch ; and when exposed to the air, in a thin layer upon a leaf of paper, it drys completely in eight and forty hours. If at another period I have expressed a contrary opinion, it was because I then took for the turpentine of the fir, an article which was that of the larch. Finally, the larch turpentine is entirely soluble in alcohol, whilst that of the fir contains a resin entirely insoluble in that menstruum. Thus, take a nebulous turpentine of the larch, and it will form a transparent solution with alcohol, while, on the contrary, the most transparent turpentine of the fir will form a lactescent and turbid solution, and, in clarifying itself by time, will deposit upon the side of the vessel, a granulated insoluble resin. These characters are moreover entirely conformable to the analyses of the two turpentines made by Berzelius, as regards

the first, and M. Amédée Caillot, as regards the second. I have, moreover, noticed the close analogy there is between the turpentine of the fir and balsam of Canada, derived from the *Abies balsamea.* Both, in fact, are liquid, almost colorless, transparent in a state of purity, very drying, and acquiring, by time, a golden yellow color, of a sweet odor, (different, nevertheless, in each,) and imperfectly soluble in alcohol. This close resemblance, however, is not astonishing, as the trees are scarcely different, both having the distich leaves, silvery beneath, and the upright cones formed of rounded scales, accompanied with bracts. Both equally furnish a resin from the vesicles, which appear twice annually upon the surface of the bark. If, then, it be desirable to find a succedaneum for the balsam of Canada, it is evident that it is the turpentine of the fir, in the same way as in place of Chian turpentine we employ mastick. With respect to the turpentine of the larch, it differs from all others, so that it cannot be substituted by any one of them.

Yellow, or Burgundy Pitch.

Nothing more is left for me in this article, in consequence of the preceding details, but to set forth the characters of the true Burgundy Pitch, for which is substituted every where a factitious pitch, fabricated out of the rosin of the maritime pine, melted and admixed with a sufficiency of Bordeaux turpentine or its essence, to give it the consistence of the native pitch. This substitution may appear to many persons of little importance; yet if it be admitted that the odor, in short, the peculiar nature of medicines, have no influence upon their medical properties, perhaps the confusion will not be regarded as an indifferent fact, which has become established between two resinous substances.

The resin which flows from the A. *excelsa,* either naturally or artificially, is colorless, at first semifluid and nebulous, and its odor resembles that of the turpentine of the A. *taxifolia ;* but by drying, when exposed to the air, a singular circum-

stance takes place; some of the parts remain white, soft, and preserve their odor like citron, while others become red, and assume a peach-blossom color, or that of the lees of wine, like assafœtida. The latter portions at the same time contract a stronger odor, which, without being disagreeable, somewhat resembles that of castor. The whole, melted together in water, as is practised in countries where the resin is prepared, affords an opaque pitch of a deep fawn color.

The odor is entirely peculiar, pretty strong and balsamic; its taste is sweet, perfumed, not bitter. Apart from the impurities which this resin may contain, it is not completely soluble in rectified alcohol, and although the quantity of insoluble resin is little considerable, it still serves to distinguish it from factitious pitch, which is completely soluble. The alcoholic solution of the native pitch has a pretty deep reddish color, and its taste is bitter, although the undissolved resin appears insipid.

The factitious pitch, or that of the maritime pine, is of a pale yellow and its color becomes paler as it is beaten with water; it easily becomes dry and cracked upon its surface, is less adherent and tenacious than burgundy pitch, has a very marked bitter taste, and possesses the strong and disagreeable odor of Bordeaux turpentine, or its essence. It is entirely soluble in alcohol.

Resin of the Larch Pine.

Several years have elapsed since our associate, M. Beral, sent me a specimen of the resin of this pine, used in Russsia for the purpose of fumigating apartments. This resin was in irregular tears, fragile, reddish upon the surface, but opaque and whitish internally; of a strong and balsamic odor, somewhat similar to castor; of a very bitter taste; it was contained in a box made of the bark of the fir. A Russian Princess, residing in Paris, had desired, unsuccessfully, to procure from us this resin, to the use of which she was accustomed; and not being able to obtain it, was obliged to send to Russia for it.

This substance, however, had several times previously been

brought to France; once it had been given to me for *Tuccamahu*, and I described it under this name in the second edition of the *Historie*, &c. Afterwards, I met with it in the cabinet of the School of Pharmacy, contained in the bark mentioned, and still more recently, M. Ramon de la Sagra, brought from the island of Cuba, among a great number of other products, the same fragrant resin, produced by a pine of Cuba, of which he had not been able to determine the species. This resin was in pretty large spherical tears, of a dull reddish aspect externally, but whitish, opaque, and of a smooth fracture internally. Its powder has the color of brick-dust. Its solution in alcohol was complete, even to the whole almost of the impurities.

I speak of this substance in connection with the pitch of the *Abies excelsa*, because, according to Haller, cited by Murray, the resin which exudes spontaneously through the bark of this tree, concretes under the form of tears, which exhale an agreeable odor when burnt; from which arises the appellation of *incense*, (in Swedish, *gran kada*,) because this resin, by drying upon the tree, assumes in part, as we have seen, the red color, and peculiar odor of Russian incense; and finally, because this is contained in a red compact bark, which appears to me to be that of the A. *excelsa*; a fact which still further establishes the presumption that it is the product of this tree. Murray, however, adds that, according to other individuals, this incense is the product of the wild pine, and we have said that in Russia, as in Cuba, it is attributed to a pine; the two opinions are therefore equal as regards value.

I was endeavoring to enlighten myself upon this subject, when, upon examining in the Royal Garden, the trunks of some trees which had been felled, I found one of them covered with resinous excrescences resembling completely that forming the subject of this note. By singular chance, a gardener, when interrogated, replied at once it was a fir tree, which afforded weight to the opinion of Haller; but farther investigation, which was more precise, proved to me that it was the trunk of the *Pinus larix*, and I found another still standing

which presented a similar exudation. Thus, what is clear to me at present is, that the larch pine produces this reddish resin, with an odor similar to that of castor, which is used as incense in several countries of the north. We should not be embarrassed by the name of Corsica Pine, which this tree also bears, for M. Loiseleur Des Longchamps has recognised its existence in the United States and Canada, where Michaux has described it under the name of Red Pine. Hence it is not astonishing that it is found equally in Cuba and the north of Europe. But as is the case with a great number of resinous exudations, this does not occur but when the tree is attacked by disease. Thus, in the Royal Garden, the superb larch pine, which is in the middle of the botanic grounds, presented no trace of it, while that which was in a languishing state, in the midst of a grove of yews, against one of the new greenhouses, presented, for two years, an exudation, increasing in proportion as the tree approached its end.

Of the Galipot and Bordeaux Turpentine.

These two products of the maritime pine are so well known that I shall speak of them only to place their characters in opposition to the two preceding resins.

Bordeaux turpentine is generally thick, opaque, grumous, possessed of a strong and disagreeable odor, and having an acrid and bitter taste. That which is most liquid, when kept in a cylindrical vessel, separates into two parts, an upper, which is transparent, always consistent, and of a deep color; and a lower, which is opaque and grumous, forming about a fourth of the whole quantity. The common turpentine of commerce does not present the liquid supernatant portion; it is very thick and opaque, and appears entirely formed of a granulated resinous deposit. Both, if exposed in a thin layer to the atmosphere, become dry in twenty-four hours. Both, even the most liquid, solidify promptly by the addition of $\frac{1}{32}$ of calcined magnesia. This property is so marked, that it is sufficient to add a sixth of Bordeaux turpentine to copaiba, which is not solidifiable by magnesia, to give to it this proper-

ty, while the turpentine of the larch not only does not solidify by magnesia, but destroys this property in copaiba, which possesses it.

The galipot, or *garipot,* is the resin of the maritime pine hardened upon the trunk and collected in winter; it is in the form of semi-opaque incrustations, solid, dry, fragile, like crystals, yellowish, having a smell like that of turpentine, and a bitter taste. It is completely soluble in alcohol.

As the turpentine of the *Abies taxifolia* has its analogy in America in the balsam of Canada, so Bordeaux turpentine is represented by that of the *Pinus australis*, or three-leaved pine, upon the banks of the Mississippi. This, in commerce, is called *Boston turpentine*, although it comes from the southern portions of the Union. It has a turbid, grumous aspect, the odor and taste of Bordeaux turpentine, and possesses the same properties.

Thus, as I have stated at the commencement of this notice, my principal object has been to describe the turpentines of commerce. I shall then pass over, in silence, the less important resins of the cedar, of the mugho pine, the cultivated pine, and others. I am, moreover, destitute of specimens which would enable me to speak with perfect assurance. I shall conclude by recapitulating the principal characters of the turpentines.

Chian Turpentine,—Nebulous and almost opaque, very consistent and almost solid, of a gray green color, or greenish yellow ; of a weak odor of fennel or resin of elemi ; of a fragrant taste, destitute of all bitterness and acridity. Treated with rectified alcohol, it leaves an insoluble residue, which is resinous and glutiniform.

Turpentine of the Larch,—Of the consistence of honey, viscid, and not running when the vessel containing it is tilted, except in hot weather ; uniformly nebulous, or incompletely transparent ; color little marked, greenish yellow ; odor tenacious, a little oppressive ; taste very bitter, united to great acridity in the throat ; very little disposed to dry, and preserving for a long time its consistence in the air ; not solidi-

fied by one-sixteenth of calcined magnesia; entirely soluble in rectified alcohol.

Turpentine of the Fir,—Milky, but becoming completely transparent by repose and filtration; entirely liquid or at least pretty fluid; odor very sweet, similar to citron; taste moderately acrid and bitter. Pretty rapidly dried by the air, and solidifiable upon the surface; equally solidified by one-sixteenth of calcined magnesia. Not entirely soluble in alcohol. The solution, turbid and lactescent at first, deposits, upon clearing, a granulated insoluble resin.

Balsam of Canada—Turpentine of the Abies balsamea,—Liquid, of perfect transparency, or occasinally nebulous, but becoming completely transparent by rest; almost colorless when recent, but taking by age a golden yellow color; odor strong *sui generis,* very agreeable; taste moderately acrid and bitter, very drying, and becoming dry and cracked upon its surface even in closed bottles, when they are partially empty. Very imperfectly soluble in alcohol.

Turpentine of the Epicia or Burgundy Pitch,—Solid, although running; very tenacious, opaque, of a fawn color, a strong balsamic odor, sweet, aromatic, not bitter taste; not completely soluble in alcohol.

Factitious Pitch of the Maritime Pine,—Almost white or pale yellow, solid, flowing, but becoming dry and cracked upon its surface. Marked bitter taste, odor strong of Bordeaux turpentine or its essence, entirely soluble in alcohol.

Bordeaux Turpentine,—Thick, grumous, and separating into two layers, one colored and transparent, the other granulated, consistent, and opaque, or rather entirely formed of a grumous deposit; consistent and opaque, of a strong disagreeable odor; of a very acrid and bitter taste; very drying in the air; readily solidified by magnesia, entirely soluble in alcohol.

Journ. de Pharm.

ART. XXIII.—ON INDIA OPIUM.

(*Extracted from a Manual of Chemistry, by* W. B. O'SHAUGNESSY. M. D., *Professor of Chemistry and Medicine in Calcutta Medical College.*)

"To this important subject I propose to devote more space than it generally claims in elementary treatises on chemistry. The place it holds as a source of enormous revenue, and an article of the highest commercial interest, induces me to treat of it in this detail; and I do so the more readily from the opportunities I have enjoyed of becoming practically familiar with the subject, having held the appointment of assistant to the Opium Agency of Behar for a considerable period. Details relative to the cultivation and gathering of the drug do not of course fall within the object of this manual; moreover, on this department of the subject, a paper published by Dr. Butter in the Journal of the Asiatic Society provides the most ample and interesting information. In this section, then, I propose to give, first, a sketch of the composition of opium; secondly, of the manipulations to which it is subjected in the Government Factory at Behar; thirdly, of the mode of assay by which its value is regulated; fourthly, an account of the exact analysis of the drug, and the composition of the varieties supplied by the subordinate agencies of Behar; and lastly, I shall describe the adulterations to which the opium is so extensively subjected, and the methods by which these adulterations may be recognised. The sketch thus given, will, I trust, prove of utility in this great revenue department, and contribute in some degree to the improvement of the drug as a medicinal agent."

The following is the result of our author's examination of opium at the Behar factory.

"The reception of opium at the Government factories commences with the hot season, and terminates late in the rains. The drug generally arrives in batches or *chelláns* of several jars, the joint production of one *zillah*, or its subordinate *kotés*

or districts. The jars contain from twenty seers to one maund and it is no uncommon event to have five hundred of these paraded in the morning for the inspection of the Opium Agent and his assistants. The first examination and the resulting classification is extremely simple. The examiners thrust a slit bambu into the contents of the jar, and judge from experience of the state of consistence, flavor, and color of the specimen. Marks are chalked on the jar according to the degree of each of these qualities from 1.1.1. to 4.4.4. inclusive.

Opium of the first class is of a fine chestnut color, aromatic smell, and dense consistence. It is moderately ductile, and, when the mass is torn, breaks with deeply notched fracture, with sharp needle-like fibres, translucent and ruby-red at the edges. It is readily broken down under distilled water, and the solution at first filters of a fine sherry color, which, however, rapidly darkens. 100 grains of this opium will yield to cold distilled water an extract of from 35 to 45. The extract is a deep brown color, and very rapidly attracts moisture from the air. If 100 grains of this opium be evaporated at 212°, it loses from 20 to 28 per cent. of water, giving a consistence of from 80 to 72, the standard of the factory.

The second class of opium is of darker color, less agreeable, small, softer texture, and often shows black specks and globules of *pasewá* on its surface and on its texture. It draws out to greater length, but breaks with a more even fracture.

Its consistence ranges from 65 to 70° and it yields an extract averaging from 27 to 35 per cent.

The third class is black, pasty, of very heavy smell, drops from the examining rod, gives off from 40 to 50 per cent. of moisture on evaporation, but, owing to the great quantity of *pasewá* it contains, often gives a far greater per centage of extract than either of the two preceding classes. The extract is very dark, and deliquesces rapidly.

The last class comprises all that is too bad to be used in the manufacture of the balls. It is of all colors, from deep black to bright brown, and of all degrees of consistence, from fluidity to a solid texture.

After the cursory examination thus described, a portion of opium is taken from each jar of each *chelán* and mixed together, and from this mass three specimens of 100 grains each are accurately weighed and evaporated to dryness on metallic tables heated by steam to 200°. When dry, the residue is weighed in presence of the native agents or gomashtas by the first assistant : the weight indicates the consistence. All specimens above 70 receive a corresponding premium in the price paid : all below that number lose in proportion. The amount of extract is taken at the same time. On these data the officers of the factory proceed in sorting the jars for mixture in great tanks, into which they are all emptied. The jars are then washed and the washing with the opium of the fourth class is used for *lewa* or paste to agglutinate the covering of petals used in making up the balls.

As the receiving season draws to a close, the opium is gradually removed from the tanks and cisterns, and exposed to the air in shallow wooden frames, until by spontaneous evaporation it becomes of the required consistence, from 69 to 70. In this state it is delivered to the cake-makers. Each cake must be of a certain weight,—the envelope of petals and *lewa* included, and it is surprising to see the dexterity and precision with which the workmen *snatch* the exact quantity required from the large dishes at their side, seldom erring more than a drachm weight in a ball of four pounds. The balls of each day's manufacture are carefully inspected the following morning, and re-opened and adjusted if required. Finally, they are stored in a large airy turret to undergo thorough ventilation and drying of the envelope.

A certain quantity of opium of the first class is annually prepared with more care for the use of the medical service, for presents to some native potentates, and to the priests of a few favored temples. An inferior kind is issued on the requisition of the *zillah* authorities, under the name of *ábkári* opium, to the licensed drug retailers of the bazárs.

The annual official reports being simply required to state the amount of morphia and extract, and to give a general ac-

count of the physical qualities of the article, comparatively little attention is usually given to its exact chemical analysis. In proof of this, I may refer to the papers on Bombay opium published in the Transactions of the Medical and Physical Society, in which even the principle *narcotine* is not at all mentioned, and to the records of the Behar Opium Agency, in none of which is any *exact* analysis recorded. Of a multitude of specimens marked *morphia*, which I received on assuming charge of the factory, few contained less than 30, many 50 per cent. of *narcotine* and other substances. These inexact returns were perhaps unvoidable under the defective state of the laboratory, and the want of a sufficient number of practical assistants competent to manipulate analyses under the superintendence of the first assistant. But as practical native chemists can now be obtained at very moderate salaries, these defects, if they still exist, will doubtless meet an early remedy.

During my employment in this department I made a very extensive series of analyses of the opium furnished by each of the zillahs composing the Behar division. In the hope that they may prove of some utility, I append the processes employed, and a tabular view of the results obtained.

In the subjoined analysis either of the following modes of examination was adopted. The first is the quickest in its manipulation. The second has the advantage of supplying directly a fine muriate of morphia for medical use.

1*st Process.*—A quantity of opium (I usually operated on a seer) is accurately weighed and well rubbed with the hands under distilled water, until it is thoroughly broken down into a thin fluid. It is then filtered through *Naipal paper*, a texture of the greatest value in vegetable analysis, as it permits very rapid filtration, and is so strong that it may be twisted while wet like linen or calico. The washing is continued until the filtered liquor gives no precipitate with ammonia, and the watery solution is then evaporated to dryness on a water bath, and marked A. 1. The solid exhausted mark remaining on the filter is marked A. 2.

By this step a volatile acid with which the narcotine formed a soluble compound is expelled ; so on redissolving the watery extract in distilled water, a black gritty crystalline powder remains. This is collected on a muslin filter, and boiled in water and filtered, and the solution which contains *meconin* evaporated to dryness. As the evaporation proceeds, globules of oily appearance collect at the bottom of the capsule, and, on cooling, crystals of *meconin* of a rosy tint are obtained.

The residue of the black powder is then boiled with strong alcohol and filtered. On cooling, an abundance of snow-white crystals of *narcotine* is deposited.

To the solution of the watery extract (A. 1) liquid ammonia is gradually added. The first portions separate a great quantity of the *black resin*, which rises to the surface, or concretes on the bottom and sides of the vessels, and should be removed with a spoon and by decanting the fluid. This resin, though at first soft, rapidly hardens, and becomes a pitch-black color and consistence. When this has ceased to separate, ammonia is added more freely, and *the solution heated to nearly* 200°. This precipitates all the *morphia* in a crystalline powder, varying in color from light fawn to that of dark clay, according to the quality of the opium under examination, and the care bestowed in the removal of the black resin in the previous step. The morphia is purified by washing it first with a little weak alcohol, and then dissolving in boiling alcohol as much as it will take up. The solution is filtered and set aside in a tranquil place, and in twenty-four hours a large crop of very fine white crystals is procured. The solution evaporated still further, yields additional crystals of an inferior color.

The watery solution of the extract A. 1, thus freed of morphia, still contains meconic acid and ammonia, codeia, narceia, gum, and coloring matter. To separate the meconic acid, add a solution of muriate of lime; a precipitate of meconate of lime is procured, which, when treated with muriatic acid, in the mode described under the head of meconic acid, yields very large crystals of bimeconate of lime. From this the pure acid is prepared according to the directions already given.

It is almost useless to look for *codeia* or *narceia*, owing to their minute proportion, in the fluid, by this process. The *gum* may be precipitated by strong alcohol, but it is seldom desirable to take the trouble of this step.

The solid mass A. 2 consists chiefly of oil, narcotine, caoutchouc, resin, and woody fibre. It should be first boiled in water acidulated with muriatic acid. Muriate of narcotine is dissolved out, and the narcotine may be separated from this by ammonia. The muriatic acid solution is generally of a pretty rose color, owing to the presence of traces of *narceia*, which have the property of communicating this tint to their dilute solutions.

The remaining solid mass is to be divided into very small portions, and allowed to rest in contact with a pretty strong solution of ammonia for twenty-four hours. This dissolves the oil and resin. The solution is decanted, and the solid mass marked A. 3. By cautiously adding an acid much diluted to this solution, the oil separates in globules which rise to the surface of the fluid, and the resin collects in dense clotted flakes, readily separated from the oil.

The mass A. 3 contains little but caoutchouc and woody fibre. The former may be removed by digestion with naphtha or sulphuric ether, and is obtained as the ductile mass on evaporating to dryness. The woody fibre or *lignin* now remains, and is characterized by its insolubility in alcohol, water, ether, or naphtha, and its fibrous thready texture.

In the preceding analysis I have taken no notice of the ulmine, which is so intimitely associated with the coloring matter that they may be classed under one head, as the general residue of the evaporation of the solution of A. 1, after the removal of its morphia and meconic acid, deducting, of course, saline or earthy matter which the incineration of a portion of the mass may show to be present.

Lastly, 100 grains of the opium examined, are incinerated in a plantinum crucible; the residue, when heated until its black color disappears, gives the amount of saline and earthy matter which the opium con tains.

2*d. Process.*—This is directed chiefly to the procural of the muriate of morphia. The first steps of washing and separation of the meconin and narcotine are the same in both. The solution of the watery extract A. 1, is precipitated by muriate of lime, and the precipitate removed by filtration. The filtered liquid is next rendered neutral by adding some powdered chalk, then evaporated to the consistence of a syrup and set aside. In twenty-four hours it becomes a crystalline mass, which must be compressed between numerous folds of Naipal paper and coarse cloth. The crystals of muriate of morphia are purified by digestion with animal charcoal and water, and by three or four successive solutions in, and crystallizations from, hot water. The salt is then dried at 150°. It still contains codeia ; and is, indeed, the preparations from which this substance is obtained.

By adding ammonia to the muriate, all the morphia is precipitated, and the muriate and *codeia* remains dissolved. On evaporating this nearly to dryness and adding a solution of pure potash, the codeia is precipitated in flakes which crystallize from a hot alcoholic solution.

The remaining steps accord with those described in the first process. The alkali *narceia* can only be separated by operating on a much larger quantity of opium than can be properly sacrificed in a public establishment.

Many other processes have been recommended from time to time for the examination of opium. Boiling the solution of crude opium with magnesia, was the method usually adopted in the Behar factory. A solid precipitate was formed, containing meconate of magnesia, narcotine and morphia, and this, when boiled in spirit, gave crystals termed *morphia* in the official reports, but which, of course, were a mixture of morphia and narcotine. By using the solution of the watery extract A. 1, in the first process I recommend, the narcotine is, however, separated, and magnesia, instead of ammonia, may then be used to separate the morphia. The method is, however, practically inconvenient, and the long boiling it requires highly objectionable, because this tends to decompose

the alkaline bases of the drug, and diminish the quantity of morphia which should be obtained.

Analysis of 14 *cases of Garden Opium of* 5000 *grains each.*

Denomination.	Consistence.	Extract.	Color of extract.	Residuum of filtered extract, A. 1.	Precipitated from extract by ammonia.	Pure morphia per cent.	Narcotine per cent.	Codeia in 5000 grs.	Meconic acid.	Meconine in 5000 grs.	Lignine per cent.	Oil per cent.	Resin per cent.	Caoutchouc.	Earthy and saline matters.
Average of manufacture 1834,	71	44	Earthy red, - -	49 gs.	212	3	$2\frac{1}{4}$	25 gs.	Averaged from 5 to 7 per cent.	8	13	Averaged from 2 to 4 per cent.	Averaged from 11 to 26 per cent.	From 6 to 10 per cent.	$3\frac{3}{4}$
1835,	7	42	Fawn, - -	5.25	217	3	2	20 gs.		9	12				$3\frac{3}{4}$
Behar Division, do.	76	40	Earthy red, - -	9	198	$2\frac{1}{2}$	$1\frac{3}{4}$	5		10	14				$3\frac{1}{2}$
Sarun do. - -	77	39	Lighter than Behar,	106	286	$2\frac{1}{2}$	$\frac{3}{4}$	. .		a trace	16				$3\frac{3}{4}$
Shahabad ditto -	76	40	Dark earthy red -	84	48	$\frac{1}{2}$	$\frac{3}{4}$	. .			11				$3\frac{3}{4}$
Tirhut ditto -	79	30	Ditto ditto, - -	46	326	$2\frac{1}{2}$		. .		5gs.	13				$3\frac{1}{2}$
Patna ditto - -	76	31	Dark clay, - -	53	337	2	1	. .		. .	12				$3\frac{1}{2}$
Bhagulpur ditto.	75	46	Earthy red, - -	45	375	$3\frac{1}{2}$	$2\frac{1}{2}$	11		10	9				$3\frac{3}{4}$
Purneah ditto. -	77	40	Light brown, -	115	232	2	2	. .		. .	11				$3\frac{3}{4}$
Hazaribagh ditto,	77	47	Light fawn,- -	54	330	$\frac{1}{2}$	4	21		11	8				$3\frac{3}{4}$
Malwah of 1829. -	89	57	Ditto ditto, - -	28.28	340	$4\frac{3}{4}$	$5\frac{1}{2}$	25		9	7				3
Patna Garden Opium, 1833, - -	87	50	Light brown, -	49	656	$10\frac{3}{4}$	6	20		14	8				$3\frac{1}{4}$
Dinajpur ditto, -	79	45	Earthy red, - -	66	370	$1\frac{3}{4}$	1	. .		. .	14				4
Banaras, 1835, -	71	41	Light brown, -	47	230	$3\frac{1}{4}$	2	11		7	12				$3\frac{3}{4}$
Pasewa from Sarun Opium,	61	50	Deep black, - -	150	354	$\frac{1}{2}$	$1\frac{1}{4}$	. .	2pc.	. .	2				3

The analysis of the Garden opium is very remarkable.

From 40 lbs. of Smyrna opium of the finest quality, M. Couerbe obtained 1 oz. of meconine, 1½ of codeine, 1 oz. of narceine, and of morphine 50 ozs., or rather more than 10 per cent. In several experiments recently described by Professor Christison in his letter to M. Guibourt, (*Journal de Pharmacie, Octobre*, 1835,) the Malwa opium gave 9½ per cent. of muriate of morphine, while, in the hands of Mr. Duncan, Turkey opium afforded 10 per cent. of that salt. The best opium grown in Egypt yields 10 and a fraction per cent. From one very fine and dry specimen of the Smyrna drug, Dr. Christison obtained 14 per cent. of muriate of morphia. In all these cases the salt was rendered snow-white, and, dried at 140° before weighing, 10 parts of muriate of morphia correspond to 9½ of crystallized morphia.

The specimen of garden opium I examined was, perhaps, the finest which ever came under chemical analysis. It was grown on an alluvial soil over the rubbish of the ancient glacis of the citadel of Patna. The poppies were irrigated three times during the season, and no manure employed. The results deserve much attention. As we can grow in Bengal, at an insignificant expense, such opium as that I have described, it would be worthy of a great government to devote a few acres of ground in the vicinity of one of the factories to the cultivation of opium for the supply of the Medical Store Department. The opium now furnished is unquestionably good, (see its analysis under the head of division Hazáribágh,) but its quality may be rendered doubly fine, indeed superior to any opium in commerce, by the measure I venture to recommend.

It is not, however, for the morphia or its compounds, that the Chinese value the drug. The narcotine, codeine, and resin are more probably the stimulating agents which they prize, and which are sufficiently abundant in the average of the manufacture."

India Journal of Medical and Physical Science.

ART. XXIV.—NOTE UPON THE BARK OF PEREIRA.

By J. Pelletier.

Some time back, during a visit to Bordeaux, a specimen was presented me of a bark which came from Brazil. My colleague, M. Guibourt, to whom I showed it, recognised it as that of Pereira, of which he had given a description in the 25th volume of the *Journal de Pharmacie*, page 706. More curious to know its nature than desirious of preserving it, I attempted upon it a few chemical experiments, and I was led to the conclusion that it contained an organic alkali, little soluble, and characterized by the beautiful purple color which it assumed by contact with concentrated nitric acid.

I wrote to Bordeaux in order to procure a greater quantity of the bark of Pereira, and continued my researches ; but I had not received an answer when M. Peretti, Professor of Chemistry at Rome, sent me a printed memoir upon the analysis of Pereira. I there found the announcement of an organic alkali, also characterized by the purple color assumed by the action of nitric acid.

It is, therefore, to M. Peretti that pertains, by right of priority, the discovery of the peculiar organic base of the bark of Pereira, and my experiments have but the advantage of confirming those of M. Peretti. But there remains much to be done upon this substance. I would wish that those chemists who can procure larger quantities of the bark, to engage in a work of investigation which promises so much interest.

Jour. de Phar.

ART.—XXV. NOTE UPON THE WHITE AND OPAQUE VARIETY OF AMBER. By C. Recluz, Pharmacien at Vaugirard.

It has been eight years since I remarked that Amber of the white opaque variety, when chewed, had a marked acrid taste, much more so than the brown variety, when treated in the same way. I concluded, from this first experiment, that the first variety must contain more succinic acid than the second, but not having been able to procure enough of it to submit to distillation, I postponed, to another period, the project of verifying my conclusion.

In January of this year, I procured half a pound of white opaque amber, containing, however, portions of the brown variety, because it was impossible to separate it entirely from the colored portions.

These eight ounces, submitted to distillation, afforded me

	oz.	*dr.*
Impure succinic acid, such as is employed in medicine, ...	0	6
Spirit of Amber, ...	0	2
Unrectified oil of Amber, . . .	5	0
Total, ...	6	
Loss, ...	2	

The brown amber submitted to the same operation, in the same proportions, afforded me

	oz.	*dr.*
Impure succinic acid, . . .	0	3
Spirit of Amber, ...	0	2
Unrectified oil of Amber, . . .	5	0
Total, ...	5	5
Loss, ...	2	3

These operations, repeated comparatively twice, have al-

ways given me the same results, which has led me to conclude, that the white opaque amber should be preferred by pharmaciens to every other variety of the same fossil resin, 1st, because its powder is more acrid, and consequently more active when employed in fumigations; 2d, that it is more soluble in rectified alcohol, and the tincture obtained being more charged with matter, must equally have greater strength; 3d, that this variety ought also to be preferred to obtain succinic acid, because it gives double the quantity of the ordinary kind; 4, lastly, that the white opaque kind ought to produce a larger quantity of the acid, and to have an acid taste more marked than all the other varieties of amber.

Journ. de Chimie Medicale.

ART. XXVI.—RESEARCHES ON THE LACTATES, AND ON THE STATE IN WHICH UREA EXISTS IN THE URINE OF MAN, AND SOME OTHER ANIMALS. By MM. Cap and Henry.

I. Having, during the last year, been required to analyse an anomalous, viscous urine, we remarked, among other circumstances, a much smaller proportion of lactic acid and of urea than is usual in ordinary urine. The remarkable properties of urea, and more especially those of lactic acid, caused us to imagine that, in this instance, the morbid state of the urine and its organic secretory apparatus, might depend upon the absence of these two principles, and we presumed, by their artificial combination, a new therapeutic agent would be obtained, which might be useful in analogous affections. Such were the motives and objects of the researches which form the subject of this essay.

The existence of lactic acid, which was long considered doubtful, has been positively established by the recent labors of MM. Pelouze and Jules Gay Lussac. The presence of this

acid has been recognised in most of the secretions and fluids of animals. It exists in the blood, milk, bile, saliva, sweat, synovia, and urine, when in a healthy state. We cannot, therefore, mistake the importance of this acid in the animal economy, especially when we remark that it disappears under the influence of certain morbid causes, as soon as the secretions alter, thicken, coagulate, and then calculi and divers concretions appear, formed, for the most part, of earthy and alkaline phosphates. But these phosphates are very soluble in lactic acid, a marked circumstance which very naturally explains the formation of the phosphatic calculi, and exhibits the necessity of the presence of lactic acid in the organic fluids.

Prepossessed with the idea of restoring to the urinary apparatus the two principles of which they are deprived in certain affections, we endeavored to combine artificially the lactic acid and the urea. We accomplished this in a complete manner by double decomposition, and obtained, after numerous trials, a *lactate of urea*, crystallized in fine prismatic needles of extreme purity, and great whiteness.

But has not this preparation its analogue in the animal economy? was now the question to be asked, and of which we did not hesitate to attempt the solution.

When we desire to obtain the urea contained in urine, we concentrate this liquid to seven-eighths. There is then deposited a large quantity of salts formed principally of chlorides, alkaline sulphates, calcareous and ammoniaco-magnesian phosphates. If we separate this mass by the filter, there is obtained a very acid, brown liquor, in which alcohol of 40° causes the formation of small crystalline, acid, hygrometric grains, which, purified by carbon, become prismatic crystals, which are deliquescent, of a sharp taste, and redden litmus. If these crystals are treated with hydrate of zinc and alcohol of 36°, there is obtained, on the one hand, a lactate of zinc, and on the other, by evaporating the alcoholic solution, a very pure urea, not hygrometric, and possessing all the properties which characterize this body. It is then evident that the crystalline grains, obtained by the simple evaporation of urine pre-

viously freed from its first salts, are principally formed of *lactate of urea.*

If we evaporate urine, rendered perfectly neutral by baryta, we obtain, after filtration, a liquid which, treated with etherised alcohol and evaporated in the open air or in vacuo, deposits crystals of lactate of urea. This salt is accompanied, in healthy urine, by free lactic and phosphoric acids, of which the presence may be readily recognised by the following process. Treat the brown product, resulting from the concentration of urine, with sulphuric ether; there is thus separated a very acid liquid, which, evaporated and mixed with oxide of zinc and baryta, will give lactate of zinc and phosphate of baryta. The granular precipitate produced by ether is principally composed of *lactate of urea.*

Being convinced that urea does not exist in human urine in a free state, but combined solely with lactic acid, we endeavored to ascertain whether this principal was combined in the same manner in the urine of other animals.

A certain quantity of the urine of a cow was evaporated to five-sixths in an alembic. The thick brown residue, shaken up with alcohol of 35°, gave rise to an abundant deposit, of a grayish yellow color, containing hippuric acid and alkaline carbonates, which were separated by the filter. The alcoholic liquor, evaporated slightly, furnished a brown product, which soon became a pulpy mass; this was expressed, and after being purified by carbon and boiling alcohol, deposited small needle-shaped crystals, which were neutral to test paper, and of a sharp, somewhat bitter, and slightly musky taste.

This crystalline mass was treated

1. By nitric acid. There was a slight effervescence, and there was obtained pearly, lamellar crystals of nitrate of urea, and long crystals of hippuric acid, (uro-benzoic acid of Berzelius.)

2. By hydrochloric acid and heat. A musky odor was developed, a brownish red deposit of a resinous aspect was form-

ed, which, purified by boiling water, gave, on evaporation, handsome prismatic crystals of hippuric acid.

3. By a slight excess of baryta. Alcohol of 40° was then added, and the liquid, after filtration and evaporation, deposited yellow crystals, which nitric acid changed in the super-nitrate of urea. The deposit not taken up by the alcohol, treated with hydrochloric acid and boiling water, on being filtered and evaporated, yielded crystals of hippuric acid. The hippurate of urea, artificially prepared and submitted to similar operation, presented characters which were entirely identical.

Experiments of the same kind were made with the urine of the horse with like results, except only that the volatile principle of the products exhaled the odor peculiar to the horse, and not to the cow. This odor, which is foreign to the hippuric acid, appears to proceed from a volatile resinous principle.

We were desirous of extending these researches to the excretions of birds and serpents. One of us had in possession a certain quantity of the excrements of the boa. We triturated these with pure baryta and a little distilled water, and, after moderately drying the mass, treated it with alcohol of 40°. The liquid, filtered and evaporated, gave, as a residue, a matter which nitric acid converted into supernitrate of urea. This latter principle was separated by means of carbonate of potassa and absolute alcohol. Urea had not been before noticed as one of the constituents in the excretory matters of reptiles.

Finally, the dried dung of the pigeon and the canary bird was moderately heated with distilled water and hydrate of baryta; there resulted a mass which was dried and subjected to alcohol of 40°. The alcoholic solution was deprived of any slight excess of baryta by means of carbonic acid, and then distilled. The residue, of a yellowish white color, treated with nitric acid, gave rise to supernitrate of urea. The baryta, separated by the filter, retained, as in the preceding case, much uric acid, which allowed of no doubt but that the urea existed in the state of urate; retaining the name uric acid, but which M. Liebig now considers as a combination of urea with a peculiar acid or a *radical*.

The first deduction we would draw from all these facts is, that in general, urea does not exist in urine in a free state ; that in man, and, without doubt, in the carnivorous animals, it is principally combined with lactic acid ; in the ruminating animals with hippuric acid ; and in birds and reptiles with uric acid, or a peculiar acid of which, according to M. Liebig, it serves as a radical.

II. Convinced, by these observations, of the real importance of the lactate of urea, we return to the study of this product, and its direct or artificial preparation.

It may be obtained either by direct combination of urea with lactic acid, or by double decomposition ; by acting on lactate of lime with oxalate of urea, or better, on the sulphate of urea by lactate of baryta. In either case it is necessary, in the first place to procure the lactic acid, or the lactates, in a perfectly pure state. The following is the process which we have found to succeed best.

Lactic acid is constantly forming in liquors which undergo the viscous fermentation and become sour, as, for example, in the juice of the beet root, the sour waters of rice and starch, mucilaginous solutions and sour milk. We have preferred sour milk, since it may be obtained in large quantities, and at a low price, from farms at a distance from large cities. Cow's milk, which is scarcely acid when first drawn, soon sours in contact with the air ; the curd begins to separate ; the serum becomes cloudy ; and, if heated, the coagulation of the curd and albumen is completed. In this state it is passed through linen, clarified by white of egg, filtered, evaporated to a syrupy consistence, and set aside for some days, when a large quantity of sugar of milk is deposited. The liquid is again strained and evaporated, by which an additional quantity of sugar of milk is deposited, and may be separated by straining or filtering. The residual liquid is now very acid ; it is to be mixed with five times its bulk of alcohol of 33°, which produces a precipitate consisting chiefly of sugar of milk. The liquid is allowed to settle, is decanted and filtered,

and a slight excess of hydrate of zinc added. The materials being thoroughly mixed by agitation, are moderately heated, and left for several days. There will then be noticed in the mass an abundant precipitate, surmounted by a clear liquid, which must be decanted and reserved for future operations. The precipitate is *lactate of zinc*, with an excess of base. It is to be boiled with eight times its weight of distilled water, and some animal charcoal; filtered while hot, and evaporated to form crystalline pellicles, which, being collected and purified, are very pure and white lactate of zinc. This salt crystallizes in fine needles, has an acid, styptic taste, is more soluble in hot than cold water, scarcely soluble in alcohol, and precipitates in white flocculi with alkaline sulphurets. Treated with baryta or slacked lime, it is changed into hydrate of zinc, and lactate of baryta or of lime.

The *lactate of lime* may also be prepared directly from sour milk, or rather with the alcoholic liquor resulting from the final precipitation of the sugar of milk. This latter liquid is to be treated with slacked lime, or a slight excess of chalk, heated, filtered while boiling, and evaporated to dryness. The residue is a kind of syrupy paste which, when moistened, assumes a crystalline mamelated appearance ; these crystals are to be drained, expressed, and treated with water and charcoal. The liquid concentrated and left at rest, becomes filled with crystalline tufts, which, dried by bibulous paper, present small crystals of a milky whiteness, crackling under the teeth, and of a somewhat bitter taste. When heated, it fuses and has a resinous appearance, but, on being moistened, does not fail to crystallize in the same manner. The lactate of lime is more soluble in hot than in cold water ; heated with sulphuric acid, a slight effervescence is produced, the mass blackens and gives off the odor of the rennette apples. We know that the acetates treated in the same manner give off acetic acid.

The lactate of baryta does not crystallize, as MM. Pelouse and J. Gay-Lussac have already announced ; it is procured under the form of a gummy matter, very soluble in water and in alcohol.

The *lactic acid* is prepared by means of these lactates of lime and baryta. The most simple process is that described by M. Pelouze, in the Annales de Chimie et de Physique. When in the state of liquid it is to be concentrated in vacuo. On the large scale, we may apply to this operation an apparatus proposed by one of us for the concentration of liquids free from atmospheric contact. This apparatus consists of a retort adapted to a refrigerant of large capacity ; this refrigerant is provided at its base with a stop-cock, and at its side with an exhausting pump, both exactly fitted. The lower stop-cock being closed, and the apparatus exhausted, the liquid is poured into the retort by means of a funnel with a stop-cock, and exposed on a salt water bath to the temperature of 50° c., or more, and thus distilled in vacuo, taking care to condense the volatile portions by means of a current of cold water. This apparatus, which is similar, in many respects to that of M. Roth, applied to the sugar refinery, offers the double advantage of distilling at a low temperature, and of avoiding the contact of air, always so prompt to alter organic compounds.

To the already known properties of lactic acid, we may add the following : when treated with peroxide of lead or deutoxide of barium, it is to a great extent changed into oxalic acid ; by the chlorites and the chlorous acid, the decomposition is rapid ; it forms, almost immediately, oxalates, of which the existence is very short, as is indicated by the effervescence and disengagement of carbonic acid, which almost instantaneously takes place.

Lactic acid, even dilute, promptly dissolves moist phosphate of lime ; it readily dissolves that which forms nearly the whole of certain animal concretions; such, for example, as the *tartar of the teeth,* which is nothing else than the phosphate of lime, mixed with a little organic matter. When placed in contact with even large fragments of this phosphate, they loosen and divide spontaneously, and soon totally disappear. Finally, the oxalate of lime is soluble, to a certain ex-

tent, in this acid. Let us now return to the artificial preparation of *lactate of urea.*

To obtain this preparation in a direct manner, we begin by obtaining the lactic acid from lactate of lime. To this end, 100 parts of lactate of lime, pure and dried at 120°, is dissolved in 200 parts of hot water, holding in solution 41 parts of pure, dry crystals of oxalic acid. This solution, when filtered, represents, in every 100 parts, 75 of pure lactic acid; 73 parts of pure dry urea is now to be added, the solution filtered and evaporated at a low heat, and crystallization effected in the usual modes.

It is, nevertheless, preferable to prepare lactate of urea by double decomposition, either by treating oxalate of urea by lactate of lime, or by acting on sulphate of urea with lactate of baryta. We should here make some observation on these two salts of urea, reserving, for the end of the essay, some general remarks upon the salts of this base, which our researches have afforded us an opportunity of studying.

The *oxalate of urea* has been described by Berzelius. It is composed of urea 62.56, and of oxalic acid 37.44, in the 100 parts. It is obtained by combining 10 parts of urea with 60 parts of oxalic acid, heated to 120°. The mixture is dissolved in 6 or 800 parts of hot water, filtered and carefully evaporated to a pellicle, when the oxalate crystallizes in a mass formed of prismatic needles, interlaced together, or in pearly tears. This salt may likewise be obtained by acting with oxalic acid on the product of the concentration of urine deprived of its salts. It is evident that in this case the oxalic acid decomposes the lactate of urea naturally contained in the urine; this oxalate is to be concentrated and purified with animal charcoal and crystallized.

The *sulphate of urea* is procured by mixing 100 parts of oxalate of urea with 125 parts of pure silky sulphate of lime; a small quantity of water is added, and heat applied for a few moments; four or five volumes of alcohol of 36° is added, the liquid filtered and evaporated; the residue is the sulphate of urea in granular or needle-shaped crystals, of a sharp and pun-

gent taste. The sulphuric acid may be separated by baryta, and the urea re-obtained by absolute alcohol. This salt has not been previously described.

If the lactate of urea is to be obtained by double decomposition from an oxalate of that base, this latter is to be first dissolved in a little distilled water, then an aqueous solution of the lactate of lime is cautiously added, so that neither salt shall predominate. The solution is filtered and evaporated at a moderate heat, or still better, in vacuo, when the lactate of urea will not fail to crystallize. If the sulphate of urea and lactate of baryta are used, analogous results will be obtained. It only remains to re-dissolve the crystals and purify them by re-crystallization.

The lactate of urea, as it exists naturally in human urine, is of difficult isolation; on the one hand, on account of the excess of lactic acid contained in the organic liquid, and on the other, on account of the great solubility of this salt, which requires an advanced state of concentration for its crystallization; and, finally, on account of its extreme volatility, which requires that this concentration should be made with the greatest amount of care.

To ascertain the mean amount in which this salt exists in urine, we evaporated a killogramme of healthy urine, made during night, to the consistence of a very clear syrup; it produced a deposit of white and confused salt, which was separated by the filter. The liquid was shaken with carbonate of potassa, to separate any excess of acid, and evaporated again until a saline product began to appear, which, on cooling, became very abundant. The whole was then put in contact with a mixture of two parts of alcohol of 33°, and one part of ether. This was heated moderately, frequently shaken during three days, and then filtered. The ethereal liquid, on being distilled, left behind, as a residue, 18 grammes of lactate of urea, crystallized in prismatic needles of a slightly yellow color.

This proportion of lactate obtained, does not represent the whole amount of the urea; a similar quantity of healthy urine

should furnish 27, (or 30 for 1000,) which circumstance confirms us in the idea that a large part of the lactate is volatillized by concentration.

Lactate of urea, either natural or artificial, crystallizes in elongated, six-sided prisms, with oblique terminations. These crystals are white, hygrometric, very deliquescent ; their taste is sharp and pungent ; they are very soluble in water, in alcohol of 38°, in etherized alcohol, but much less in pure ether. Heated moderately, they first fuse, then volatillize without decomposition, and then sublime. If the temperature be raised, a black, carbonaceous residue is left behind.

When the lactate of urea is heated with hydrate of zinc, and the product treated with absolute alcohol, the urea is separated, and the residue, insoluble in alcohol, on being dissolved in boiling water, will furnish crystals of lactate of zinc.

This new mode of obtaining urea, it appears to us, should supersede that which consists in previously converting it into a nitrate. To convince us of this, we treated the same quantity of urine, 1, by nitric acid and the usual means ; 2, by slacked lime ; 3, by hydrate of zinc. In the three cases, the quantity of urea obtained was nearly the same ; nevertheless, by nitric acid, there are more chances of loss, through the easy decomposition of the nitrate by heat ; by lime, a product was obtained, which it was difficult to purify ; whilst, by hydrate of zinc, the manipulations are easy, and the lactate of zinc may be used to prepare lactic acid, or other lactates.

The lactate of urea is formed, in the 100 parts, of

Dry urea, - - - - - - -	49.61
Lactic acid, (as it exists in saline combination) -	50.31

This composition represents in atoms :

Lactic acid, supposed to be anhydrous,	1	atom.
Urea - - - - -	1	"
Water - - - - -	1	"

Which leads to the following formula

$$C^2H^3N^4O^2+C^6H^4O^4+OH$$

The natural lactate of urea, obtained from urine, presents exactly similar qualities with the same salt artificially prepared.

III. We have succeeded in obtaining many other salts of urea by the mode of double decomposition, which has answered so well in the case of the lactate of this base. These salts, which have not been previously described, crystallize with great facility, and possess well characterized chemical and physical properties; such are the sulphate, phosphate, hydrochlorate, acetate, tartrate, and quinate of urea, with several others. They are, for the most part, to be obtained by treating the oxalate of urea, by means of different salts of lime and alcohol. Many of them are volatile at a moderate, and decomposable at a higher temperature; all are soluble in water and alcohol. When treated with lime, baryta, or oxide of silver, and the mixture agitated in alcohol, this menstruum separates crystallizable urea, and forms a salt with the base, lime, baryta, or silver. The salts of urea, exposed to the action of nitric acid in excess, furnish a supernitrate of urea.

These different properties suffice to distinguish them from ammoniacal compounds, from which they also differ by other characters.

We will here remark upon the ordinary process for obtaining urea. According to this, after separating foreign salts and again evaporating, the liquid is *allowed to become cold,* and nitric acid then added. If the evaporation is pushed to a convenient extent, the nitrate of urea becomes a mass of small pearly crystals, of a gray or rose color. These crystals are drained, and the mother waters, separated and evaporated, furnish a new crop; but all these crystals are purified with difficulty. We have remarked that if, in place of adding the nitric acid to *cold* concentrated urine, it be poured into *hot* weak urine, a slight reaction takes place, from which results, not a mass of

colored plates, but white plates of the supernitrate, completely pure, and not in less quantity than is furnished, with more trouble, by the former modes. We would hence conclude that the precaution of cooling the mixture has no advantage; on the contrary, by acting with heat, a nitrate is obtained, from which pure urea is separated with greater facility. To ascertain whether this mode effected any sensible alteration in the organic base, we converted two grammes of dry urea into supernitrate, with the assistance of moderate heat. After evaporating almost to dryness, the salt was treated with carbonate of potassa, and then by cold alcohol of 38°, which extracted a weight of urea equal to 1.89; a slight loss well compensated by the extreme simplicity of the new mode of extracting this base.

The researches of which we have presented the results, are but the first part of the labor to which we have applied ourselves, and which has for its object the therapeutic action of lactic acid, the lactates and salts of urea. For the present, we have arrived at the following conclusions:

1. Urea does not exist in a free state in urine.

2. In man, this base is combined principally with lactic acid; in the ruminants, with hippuric acid; in serpents and birds, with uric acid, or, at least, a peculiar acid which, according to M. Liebig, is its radical.

3. The natural lactate of urea, extracted from human urine, is identical with that prepared artificially.

4. The salts of urea are readily obtained by double decomposition.

5. Finally, the properties of lactic acid would lead us to the hope of finding, in the lactates, new and powerful therapeutic remedies.

The continuation of these researches will have for its object the means of obtaining, readily and abundantly, the lactic acid, and its combinations for physiological and medical experiment.

Journ. de Pharm.

ART. XXVII.—NOTE ON THE STONY SUBSTANCE USED IN CHINA IN TIMES OF FAMINE, UNDER THE NAME OF FLOUR OF STONE. By M. Biot.

The details communicated to the Academy, by M. de Humboldt, on the existence of a stony substance which is sometimes used in Laponia in the times of scarcity, has called to mind a similar fact, an account of which has recently arrived from China, and is reported in the Missionary Correspondence. My son having also found the same fact attested for many ages in the Japanese Encyclopedia, with the dates annexed, I have engaged him to translate the passages which are there reported; and I think that the Academy will be interested in the collection of the documents on a practice which is in reality more extensive than has been believed.

"The Japanese Encyclopedia, book 61, relative to stones and minerals, contains an article entitled *Chimien*, or *stone flour*. The following is the translation, in which will be found the same superstitious ideas as those given by Humboldt for Laponia."

The *Pen-tsao-kang-mon** says, "Stone flour is not an ordinary production; it is a miraculous substance. Some say that it grows in times of famine. Under the Emperor Hien-Tsong, of the dynasty of Tang, in the period *Tien-pao*, third

* This is a collection of Chinese natural history, compiled towards the year 1575 of the Christian era, from the most ancient works. M. S. Julien has exhibited to my son the copy of the Pen-tsao-kang-mon, which he has; the quotation made in the Japanese Encyclopedia has been verified with the original text, and found to be exact. This text gives, besides, the names of the districts where the stone flour is found. Many form part of the northern province of Chan-si, where the cold of winter is often very intense; others appertain to the maratime provinces of Chan-long, Kian-Nan, near the mouth of the Yellow river, where inundations are frequent. The provinces of Hon-Kouang and of Kiang-Si, for which the missionaries attest the same fact, are different from these, and are situated in the valley of the Blue river.

year, (744 of the Christian era,) a miraculous fountain sprung from the ground, the stones decomposed and were changed into flour." This text is accompanied by a wood cut, which represents the fountain flowing in cascades and the stones dividing into threads ; but they are so incorrectly marked that we cannot assimilate them to any mineralogical formation.

Under the emperor Hian-Tsong, of the same dynasty, in the period *Yuen-ho,* fourth year, (A. D. 809,) the stones decomposed and became flour. Under the emperor Tching-Tsong, of the dynasty of Soung, period Tsiang-fou, fifth year, (A. D. 1012,) there was produced, from stone, a substance like flour. Under Jin-Tsong, period *Kia-yeou,* seventh year, (1062,) stone flour was produced or grew. Under Tchi-Tsong, period *Yuen-fong,* third year, (1080,) the stones were decomposed and became flour. Every kind of stone flour was gathered and eaten by the poor.

The following is what is written in 1834 by the missionary in China, M. Mathieu-Ly, established in the province of Kiang-si.* The facts which he describes are reported for 1834, and the three preceding years, so that they coincide with those cited by M. Retzins for Laponia.

"Many of us Christians would certainly have died of famine this year. God alone could have relieved such extensive want ; the whole harvest had been carried off by the overflow of the rivers. For three years an infinite number of persons were sustained by the bark of certain species of trees which are found in this country ; others ate a light earth of a white color, which had been discovered in the mountains. This earth was worth its weight in silver, and all could not procure it. The people at first sold their wives, their sons, and daughters, afterwards their household utensils and moveables, and finally demolished their houses to sell the materials thereof."

Another missionary, M. Rameur, writing from the province Hon-Kouang, in the middle of the year 1834, gives no less deplorable details.

* Ann. de la Propag. de la Fois., Sep. 1836.

"The district Fan-Hien," says he, "contains about a thousand Christians; but they have been horribly decimated by famine. I have seen a great number come to demand the last sacrament; they had calculated their resources, and knew the number of days they had to live. They received the sacrament of extreme unction, when they had exhausted their means, and then calmly awaited the moment of their decease."

To understand the occurrence of such calamities, and their frequent return in a society so laborious, devoted to agriculture and regularly governed for many ages, it must be recollected that many provinces of China, of greater extent than one-half of France, consist of level plains, traversed by large rivers, of which the bed is continually rising by the abundant deposit from the waters, so that they are compelled to restrain them by elevated dikes, kept in repair by immense labor. The provinces of Hon-Kouang and Kiang-Si, for example, of which mention has been made, are thus traversed by the Blue, and other large rivers.

These circumstances, giving every facility for irrigation, develope an extremely active state of agriculture, of which the bountiful produce is rice, which is cultivated on the undulations of hills, whence the water is carried by means of machines. As long as this state of things lasts, there is produced an immense quantity of necessaries, which likewise gives rise to correspondent increase of population; but when the waters increase so as to overflow the dikes, it pours down upon the plain, inundates it, and swallows a part of the population; then those who escape from this disaster find themselves ruined and deprived of every resource, inasmuch as the land is covered by the waters, and remain a prey to all the miseries which the missionaries describe, and finally die of starvation. This cause, joined to other catastrophes produced by earthquakes, which appear to be more frequent, more violent, and, especially, more extensive in China than in many other regions of the globe, instruct us, in a great part, as to the sudden vicissitudes which Chinese history attests to have recurred many times

among the population of this vast empire; vicissitudes which bear no proportion to the regular laws of European population, as may be seen in an account published in the Journal of the Asiatic Society, and of which I present a copy to the Academy on behalf of the author.*

Am. de Chim. et de Phys.

ART. XXVIII.—FATAL EFFECTS FROM ACETATE OF LEAD GIVEN IN LARGE AMOUNT FOR PHTHISIS PULMONALIS. By Dr. Bicking, of Mulhouse.

Although we possess a large number of observations in which the acetate of lead has been given with success, or, at least, without serious accident, for phthisis pulmonalis, there are others in which troublesome results have followed from the prolonged use of this medicine, and, on this point, Dr. Bicking cites the following case:

Ferdinand R———, aged fifteen years, subject, during his younger days, to attacks of scrofula, suffered several times from affections of the chest, and finally became consumptive. Having arrived at an advanced stage of this affection of the lungs, accompanied with hectic fever, sweats, and colliquative diarrhœa, without any remedy having power to arrest or alleviate its course, Dr. Bicking commenced with the use of acetate of lead.

I gave, says he, to the patient, a quarter of a grain of acetate of lead reduced to powder, along with sugar of milk, four times a day, during a certain time. Under its influence, I obtained a marked amendment in the course of the morbid symptoms; the fever, the sweats, the dejections, and cough dimi-

* Account of the population of China and its variations, since the year 2400 before the Christian era, to the third century after. By Edward Biot.

nished. The purulent expectoration likewise diminished, without any increase of oppression; this advantageous result induced me to continue the treatment, and, during six weeks, I successively increased the dose of the medicine, so that at the end of this time the patient took two grains of the acetate of lead during the day.

At this period, the patient experienced a marked relief, troubled from time to time with some returns of the same general symptoms from which he had been relieved, and, at each return, I employed, with success, the same means. In twelve weeks every trace of phthisis had disappeared, and the child, who returned to school, was no longer subject to medical treatment. He had taken, in the course of the disease, nearly an hundred and thirty grains of acetate of lead, without any poisonous or even hurtful effect.

In the meantime, he could not regain, entirely, his health; his strength declined, he became thin and pale, and his pulse frequent; frequent difficulty of respiration, pains in the chest, and an obstinate cough of irritation. I was apprehensive of an immediate renewal of the consumptive attacks. My fears were realized, but in another manner.

One month after the appetite gradually failed, the hypochondrium became affected with painful spasms; the stools were rare and painful; the skin over the whole body became blueish; the countenance became puffed up and hot, the hair fell out; soon a convulsive cough supervened, accompanied by great difficulty of respiration, and burning pains in the chest, to which succeeded partial paralysis of the feet. This state remained fourteen days. One evening he experienced a violent access of fever, with heaviness of the head, paralysis of the eyelids, and convulsions in the face and extremities.

All remedies were unavailable; the patient remained insensible, in stupor or delirium; he died the third day after, but no autopsy was made.—C. W. *Hufelands Journ. des Pract. Heilk.* 1839.

The publication of this notice should not, however, lead to

the belief that the medicinal use of acetate of lead is always followed by fatal effects. We believe that it is necessary to study the therapeutic action of this acetate; we know that large quantities of this salt have been taken, in several cases, and we have seen Dr. Bricheteau treat, with pills of acetate of lead, Mademoiselle C—— S——, who was considered to be affected with consumption. This treatment was followed by great success, and the lady is now married, and has several children, and enjoys a good state of health. A. C.

Journ. de Chim. Med.

The above case is one of those rare occurrences in which a remedy, in many cases of great advantage, has been followed by lamentable consequences from its prolonged use. It may be advantageous to enquire to what cause such effects may be owing. In addition to the observations in the note of M. A. Chevallier, it may be asked, may not this effect arise from the formation of a carbonate of lead in the stomach of a patient whose digestive organs are much debilitated? Although pure neutral acetate of lead is not affected by free carbonic acid, nevertheless the acetate of the shops is always more or less affected by the presence of this gas, solutions always being cloudy when not made with distilled water. This is due to the loss of a portion of acetic acid, consequent on the exposure of the crystals to the air. This exposure is followed by an opacity of the external crystals by efflorescence, but that, in this instance, the result is not entirely owing to the loss of water of crystallization may be concluded from the strong smell of acetic acid which is exhaled by a jar of acetate of lead when recently unstopped. In this country, the acetate is commonly used in much larger doses than is here stated: a very common prescription, especially in dysentery, cholera morbus, &c., being two or three grains of the acetate frequently repeated, and it is rare indeed to hear of any injurious effects therefrom. The custom, however, here, is to unite, in the same prescription, a greater or lesser quantity of opium, as a means of obviating any injurious effects of the remedy, as well as to fulfil other

indications in the above diseases. That it may have this tendency, will be obvious in considering the reactions which will be consequent on the mixture of these two ingredients. The meconic acid of the bimeconate of morphia would first neutralize any excess of oxide of lead in the acetate, and then the remainder would unite with more of the lead, and liberate acetic acid, thus forming an insoluble meconate of lead, which would pass through the intestines and be discharged. This remedy, however, is not employed to the same extent here in chronic cases, where a long continued use is required to produce its full effect, as it is in Germany. In this latter country it is very highly recommended in consumptive affections, and effects may result from its prolonged use, which would not appear from a greater amount of the remedy given in a much shorter time. R. B.

ART. XXIX.—ON THE TRANSFORMATION OF CALOMEL INTO CORROSIVE SUBLIMATE. By M. Mialhe.

I have the honor to communicate to the Society of Pharmacy, the summary of some experiments which I have made on the transformation of calomel into corrosive sublimate, experiments which I was suddenly forced to interrupt.

The point from which I started with my researches, was the following fact, reported by Vogel. A physician prescribed for a child twelve papers, each containing five grains of sal ammoniac, five grains of sugar, and half a grain of calomel: the child having died after taking several of the powders, the apothecary was accused of having committed an error in compounding the prescription. Luckily for our colleague, the accusation which hung over him was of short duration, Peter Koffer having quickly proven that, in presence

of sal ammoniac and of water, calomel is partially changed into corrosive sublimate. This fact, of which I have ascertained the exactness, has always appeared to me very remarkable, and well worthy of fixing the attention of physicians and physiologists. It would not be so, if the assertion of one of the most distinguished professors of our school were founded in fact. This professor asserts to have proven, by means of experiment, that the chemical change of protochloride of mercury into deutochloride, does not take place under the circumstances stated by the German chemist. I shall not attempt to point out whence is the source of the error into which our learned colleague has fallen ; I shall at present content myself with publishing the conclusions which result from my experiments.

1. The protochloride of mercury, in presence of hydrochlorate of ammonia, or of the chlorides of sodium or potassium, and of pure distilled water, is changed partly into deutochloride of mercury, and into metallic mercury. This change takes place at the temperature of the human body, and even at common temperatures, and demands but few moments of contact to be effective. It is sufficient, for example, to be convinced of this fact, to allow calomel to remain a few minutes in the mouth ; a mercurial taste, of sufficient intensity, will not be slow in exhibiting itself. This taste is the result of the mutual reaction of the chloride of mercury, and the alkaline chlorides in the saliva.

2. It is to the change of calomel into corrosive sublimate, and metallic mercury under the influence of sea-salt and the salts of ammonia, which we know exist in the liquids of the alimentary canal, that we must attribute the pathological phenomena of mercurial salivation, from the administration of calomel. What proves that this is really the case, is, that, when the protochloride of mercury does not purge, but is retained for a long time in the digestive tube, it excites an unusual secretion from the salivary glands, and this on account of the large quantity of corrosive sublimate which is

produced. The same phenomena happens after the long continued use of the protochloride of mercury, and from the same cause.

3. As the quantity of corrosive sublimate formed can only be proportional to the amount of alkaline chlorides which are contained in the viscera, those persons who eat large quantities of common salt, every thing else being equal, should be more susceptible than others, when under a mercurial course of medicine.

4. The antisyphilitic properties are communicated to it, either in whole or in part, by the sublimate and the mercury to which its chemical decomposition gives rise. It is, without doubt, the same as regards its anthelmintic virtues; it is by producing poisonous effects on the ascarides, by means of the two agents mentioned, that the mercurial chloride relieves us from these importunate guests.

5. All that has been said of the medicinal action of calomel, may likewise be predicated of the prot-iodide of mercury, which, under the same circumstances, is converted into deutiodide.

Journ. de Pharm.

ART. XXX.—ON THE ACTION OF THE METALLIC SALTS ON ALBUMEN AND ON ANIMAL TISSUES. By J. L. LASSAIGNE.

Extract.

CHEMISTS have stated that most metallic solutions precipitate albumen. This action has by many chemists been ascribed to the decomposition of these salts, and the union of the oxide with the organic body. No positive experiments having as yet been made to confirm this opinion, the author of this paper has undertaken a series of experiments, of which the results establish, contrary to the received opinion, that, in the action of albumen upon metallic salts, this principle unites directly with these compounds without producing any decomposition. The examination of the resulting combinations has shown that they possess properties, of which the most essential are exhibited under the following conclusions:

1. Albumen, as the experiments related in the paper of M. Lassaigne demonstrate, has the property of uniting with metallic salts without decomposing them, and produces with them compounds which are insoluble in water, when these bodies are in certain proportions, but susceptible of solution when the albumen or the metallic salt is in excess.

2. These compounds, which may be called *albuminates*, appear to result from the action of four or six atoms of albumen upon one atom of the metallic salt, as is indicated by the analysis of the combinations which have been examined in these experiments.

3. These combinations, when hydrated, possess the singular property of dissolving in many of the alkaline salts, which are capable of decomposing the metallic salts of the compound when not united to the albumen.

4. It is probable that, when administered internally, the metallic salts, in consequence of their absorption, form analogous compounds, either by union with the albumen contained

in the fluids, or with the tissues of our organs, and that in this state it is then carried into the system, and produces there its medicinal effects.

5. It is therefore interesting for therapeutics to examine the effects which albuminous compounds with metallic salts have upon the animal economy.

5. In the action of a metallic salt upon any tissue, there is at once established a combination between these two bodies, which, modifying the vital properties of this organic part, produces a change in its functions.

The metallic salts, in their relation with soluble albumen and the organic tissues, act similarly to the bichloride of mercury, as has been already stated. These new facts serve to generalise the known chemical action of the bichloride of mercury upon albumen and the organic tissues.

Journ. de Chim. Med.

MISCELLANY.

Case of Poisoning by the Essential Oil of Bitter Almonds, observed by M. Chavasse.—M———, druggist, had placed a bottle of the essential oil of bitter almonds in a closet, without labelling it; along side was another bottle, also not labelled, containing sweet spirits of nitre. In the meantime his health was good, with the exception of occasional suffering from nephritic pains. While suffering from a smart attack of this complaint, he went in a hurry to the bottle of sweet spirits of nitre, and swallowed, at one draught, the amount of half an ounce; but, by mistake, he had inadvertently taken the bottle of oil of almonds, in place of the other. Immediately discovering his error, he sent for a physician. In half a minute after, he became pale, fainted, and was convulsed; his countenance became deathly pale and his pulse imperceptible.

M. Chavasse quickly arrived; he found the patient on a bed. The syncope had gone off in a few minutes after he had lain down; he immediately vomited much alimentary matter and bile, smelling strongly of prussic acid. Deadly palor, general coldness, a pulse at first small, frequent, intermittent, then small and regular; sub-delirium, incoherent muttering, convulsive movements, especially of the eyebrows; then sardonic laughter, gay appearance and brilliancy of the eyes, short and panting respiration, attacks of suffocation, and accessions of convulsions were successively exhibited by the patient. M. Chavasse looked for a stomach pump, but not finding any, he vomited the patient by hot water and sulphate of zinc, which he gave to the amount of three gros. He at the same time endeavored to restore the temperature of the body by means of bottles of hot water and hot cloths; but he did not lose sight of the most essential point, after vomiting, the administration of stimulating remedies. He gave to the patient a mixture of brandy and ammonia, diluted with water. The amendment was immediate; the pulse, the temperature, and the functional action were gradually relieved, and the patient passed from death to life.

The following draught was continued: Ammonia, 1 gros.; tinct. cardamom, 1 ounce; mist. camph., 7 ounces; and the patient recovered.

Journ. de Chem. Med.

Poisoning in rabbits by large doses of Sulphate of Quinine. By M. Desiderio.—The author, in a paper written in Italian, makes known the results of nine experiments in which he gave rabbits the sulphate of quinine,

either alone or united with other substances. In the two first experiments, 40 grains given to adult animals produced death in less than five hours. A young rabbit was killed in six hours by fifteen grains. In the other experiments the author associated with the action of the sulphate of quinine, that of alcohol weakened with water of canella, that of distilled water of the *Laurus cerasus*, and, finally, that of opium.

Journ. de Chem. Med.

Poisoning by Aconite.—It is well known that the *Aconitum napella* is a violent poison. Matthiole, Pallas, and other authors have related cases of poisoning by this vegetable, which is found extensively in our gardens as an ornament. Here is another example of the danger of this plant.

At Suippes, (Marne,) a young child, aged twenty-one months, in full health, was taken into the garden by her mother, who stopped along side of a very poisonous plant, the *Aconitum napella*, commonly known as monkshood. The child pulled some leaves and two or three flowers which she swallowed. Her mother, attracted by something else, immediately on perceiving it, although entirely ignorant of the dangerous properties of the plant, took it from her hands and threw it away. Unfortunately it was too late; at the end of half an hour the child began to stagger, its appearance became animated, and it was soon unable to stand. At first, the parents supposing that she had drank some wine at a neighbor's, were not alarmed. Nevertheless, as these symptoms increased more and more, and the little patient complained continually of pain in the stomach, they called a physician, about two hours after the first manifestation of the complaint. This person immediately recognising in the child the symptoms of poisoning, hastened to administer, as an antidote, some spoonfuls of an emetic draught, which immediately produced vomiting, but the aid was unfortunately too late; at the time the physician caused the child to take some more of the same draught, he perceived the eyelids convulsed and the jaws to be set, the body to become rigid and bent back, and the limbs to be convulsed. Five minutes after the child was dead.

Journ. de Chim. Med.

Sublimed Benzoic Acid. By Fr. Mohr.*—The new French Pharmacopœia directs that benzoin should be mixed with its weight of fine sand, before it is introduced into the vessel, and recommends that the vessel should be shallow, and covered by an unglazed vessel, somewhat resembling an inverted flower-pot. The addition of sand is neither necessary or advantageous; its use, on the contrary, gives rise more readily to empyreumatic products, and at an indeterminate degree, for in it are united all the conditions necessary for the production of the colored oil. After ma-

* Annal. der Pharm. vol. xxix, cap. 2.

ny experiments, the following process has been recognised as free from all fault: the lower vessel is a circular and flat casting, of the diameter of eight or nine inches, and the sides two inches in height. A vessel of iron answers the purpose very well. About one pound or less of coarsely broken benzoin is to be strewed regularly over the bottom. Over the opening of the pot, unsized paper of a loose tissue is to be stretched, and fastened to the sides by paste; a cap of thick wrapping paper is to be placed over the whole, and adapted very accurately to the sides of the vessel, so that there may be no opening; this is then to be strongly tied to the base. The most certain mode to obtain a uniform application of heat is to place a large metallic plate on a tripod, to pour upon it some sand, and to fix solidly the subliming apparatus thereon; a slow charcoal fire is to be applied beneath the plate and kept up for three or four hours, keeping in mind that the beauty of the product depends on the regularity of the heat, and the slowness of the operation. The plate, placed under the apparatus, serves not only to spread the heat, but prevents the ascending current from the fire from striking the paper cap. When the operation is terminated, the apparatus is to be allowed to cool completely, to be then inverted, and the cord detached; extremely beautiful flowers of benzoin will then be found in the cap. A cap of the size and form of an ordinary hat for the human head, is preferable to a cone of paper. The essential advantages of this method consist in the unsized paper stretched over the vessel, and through which the vapors of benzoic acid are compelled to pass. I am convinced that it is not necessary to perforate the paper with holes, but that the loose tissue suffices for the transmission of the vapors. The flowers of benzoin deposit, almost completely, their fetid coloring oil during their passage. They exhibit a brilliant white appearance, and exhale a strong and agreeable odor of benzoin, and the paper is strongly colored by the empyreumatic oil. The paper likewise prevents the sublimed flowers from falling back into the cake of benzoin, without which there would be a constant re-sublimation of the flowers, and, finally, a decomposition; the paper finally prevents the condensed benzoin from being affected by the radiant heat from the bottom of the vessel; so that the condensation takes place with greater facility, and, for this reason also, there should be no opening in the paper cap. The French pharmacopœia says the fire should be regulated by the disengagement of the vapors; this care is here superfluous; a slightly elevated temperature does no harm; because the paper cap is always cooled on its exterior, and constantly protected against the heat from the bottom of the vessel. The product of sublimed flowers is always less than by Scheele's method; there is commonly obtained 4 p. 100 precisely, as the French Pharmacopœia points out. A. G. V.

Journ. de Pharm.

On the presence and extraction of Carbonate of Soda in Hungary. By A. Werner. (Journ. per Practic Chem.)—The localities most abounding in

carbonate of soda are in Little Cumania, especially in the neighborhood of the town of Shegedin, where there already exists five establishments for its extraction; and in the county of Bicharer, in the neighborhood of Maria Theresiapel. This salt, which is called *székso* in the language of that country, effloresces from the ground in damp places, where it covers the surface with a crust as white as snow. The season most advantageous for its collection is the spring, after the clear nights which have produced much frost and before sunrise. The soil is considered to be less rich after the rise of that luminary. The collection may also be made in summer and fall under the same circumstances.

The soil, which is of a grayish white, being swept into heaps, is bought by the manufacturer. Its value is tested solely by its taste. It is then washed in square tubs, until the taste no longer indicates the presence of saline matter; these weak solutions are then turned anew on fresh portions of soil. The liquor, which is of a deep brown, contains, besides the carbonate, both sulphate and muriate of soda, with ulmates and other impurities; it is evaporated to a syrupy consistence in a large vessel made of strong iron plates; it is then conveyed to another evaporating vessel, likewise of iron plates, placed near the first, and in this it is evaporated to dryness. The resulting mass is calcined in a large furnace until empyreumatic vapors cease to be given off, and then fused at a red heat; when half cooled, it is withdrawn from the vessel. When completely cold, the soda is white, and is now broken in pieces; it is employed in that country for the manufacture of soup, and likewise exported as crude soda.

A. G. V.
Journ. de Pharm.

An examination of an animal coloring powder called Syria. By J. J. Virey.—There is imported from London a powder of a very deep violet reddish-brown color, pretty heavy, inodorous and insipid, but tinging the saliva of a beautiful carmine red. This powder is dense, and little volatile; it communicates, almost instantly, either to water or alcohol, a beautiful purple tint, deep and solid. Nitric, acetic acids, &c., brighten it, by giving to it a reddish shade, which resumes, however, in the air, a more violaceous tint.

It was a question with us to determine the nature of this product; placed upon a sheet of red hot iron, this powder gave off thick white vapors, of an animal character, and only left a puffy charcoal, difficult to incinerate. This character thus evinces the essential animal nature of the substance. It was then proper to inquire in what order of animal substances could be found the source of this carmine red powder.

We had thought that, as there was collected in the East, especially in Asia Minor and the whole of the Levant, a large quantity of the *Kermes animal*, *Coccus ilicis*, all that had been done was to separate the purple

juice, so rich in the *coccine* of Lassaigne, which is analogous to the *carmine* of Pelletier, and obtained from the entire cochineal. But it is known that after the expression of the juice of the Kermes, for tinctures, for syrups, or the exciting liquors so much used in the East, (l'Alkermès) the residue, the debris of these gall insects, contain a semi-corneous envelope, and other dry organs, connected with matter nearly useless. The greater part of these remains, in fact, is composed of the corneous substance, common to most insects and called *chitine*, with some mineral salts, (phosphate and carbonate of lime,) which ordinarily accompany it.

But it was easily shown that these debris still contain a notable quantity of coccine, the red coloring matter.

It was only necessary to submit this dry residue of Kermes to porphyrisation, and to give an eastern name to the substance to increase its value, to disguise it under the title of *syria*, syrian powder.

Further, it is evident that there can be obtained a sufficiently large quantity of purple coloring powder, and a pigment more or less solid of this powder, but we have not observed it with the vivid, brilliant, and pure tints, which the carmine of cochineal or its magnificent preparations present, yet it is probable that a useful application of syria may be made in the art of dyeing, and to color either papers or tissues, and a multitude of substances in daily use.

Journ. de Pharm.

ADDITIONAL NOTE.—It has been suspected that the *lac-lake* or lac-dye enters into this coloring powder, because both present equally a purple color. But the specimens of lac-dye, in violet reddish-brown cubic cakes, such as have been described by us in the *Journal de Pharmacie* for 1821, tome vii, pages 523–4, at the termination of our memoir upon lac resin, are not completely incinerable by fire, like the powder of syria. Besides, lac-dye contains also a portion of friable magnesian talk, which has received the color so as to be employed in water colors, which is not the case with the syria; it affords no earthy parts and gives no effervescence with acids as I have determined. It has, nevertheless, a specific gravity greater than lac-dyes; for the latter retains a portion of lac resin, suspended in the caseum of milk by aid of soda, then precipitated by citric acid. On the contrary, the powder of syria, equally soluble, as regards its coloring portion, in water and alcohol, does not contain an abundant resin, like the lac. Such are the differences between these coloring matters.

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ART. XXXI.—CHEMICAL EXAMINATION OF THE ROOT OF FRASERA WALTERI. By JOHN WYETH DOUGLASS.

(*Extract from an Inaugural Essay.*)

THERE has been no regular analysis of this plant. Dr. Drake of Cincinnati made a few experiments on the root; they seem, however, to have been instituted more for the purpose of ascertaining the means of discrimination between the Frasera and the tonic of Mozambique, than to determine its chemical constitution. Thus he says, "this root (F. Walteri,) gives out its bitterness more fully to alcoholic than aqueous menstrua; the reverse of which is the case with columbo; its spirituous tincture suffers decomposition upon the addition of water, indicating that it contains resin, which the Columbo does not, at least in any considerable quantity," &c. The following experiments were made with the dried root.

To the filtered decoction alcohol was added, which produced a flocculent precipitate indicating the presence of gum or mucilage. The solution of acetate of lead also precipitated a large quantity of gum.

The non-existence of starch was ascertained by adding tincture of iodine to the cold decoction, which was not affected by this delicate test.

Upon the addition of oxalate of ammonia to the clear in-

fusion, a slight precipitate was observed, showing lime to be present.

A portion of the bruised root was submitted to the action of water slightly acidulated with hydrochloric acid; to this infusion, which was of a light wine color, oxalate of ammonia was added; a greater precipitate than in the simple infusion was observed, from which circumstance it may be supposed the larger portion of lime was in combination with an acid, most probably the carbonic, which compound is insoluble in water; the decomposition of this salt would take place on the addition of the acidulated liquid, affording a solution of the soluble hydrochlorate of lime, which in turn would be decomposed by oxalate of ammonia; producing a dense white precipitate of the very insoluble oxalate of lime.

The ashes obtained by incinerating a portion of the root were treated with very dilute hydrochloric acid, which produced effervescence. When filtered to separate a small quantity of charcoal, oxalate of ammonia or soda produced a dense white precipitate, thus confirming the preceding experiments in testing for lime.

The presence of iron was not indicated by the addition of ferrocyanate or sulphocyanate of potassa to the decoction.

On the supposition that iron might be present in the state of protoxide, a portion of the root was boiled in water acidulated with nitric acid. This action would have converted it into sesquioxide: but no blue compound was formed by the addition of ferrocyanate of potassa.

When a salt of the sesquioxide of iron was added to the decoction or infusion, it assumed a greenish-black color; showing tannin to be present; and that variety which exists in Peruvian bark, kino, &c. &c.

Solution of gelatin produced no change whatever in the infusion or decoction, from which we may judge the tannin to exist in small quantity.

Nitrate of silver caused a white precipitate.

Solution of potassa deepened the red color of the decoc-

tion. The same phenomenon took place on the addition of water of ammonia.

Sulphuric acid nearly destroys its color.

The infusion was not affected by the following metallic salts: bichloride of mecury, sulphate of copper, sulphate of zinc, and tartrate of antimony and potassa.

The decoction was made by boiling an ounce of the bruised root in a pint and a half of water to one pint; it was of a light wine color, and did not affect litmus or turmeric paper. The infusion was prepared by adding a pint of boiling water to an ounce of the bruised root. The tincture was of a dark wine color, and prepared by macerating one ounce of the bruised root in a pint of diluted alcohol for fourteen days. By macerating an ounce of the bruised root in half a pint of alcohol, specific gravity, .84, a tincture was obtained of a light straw color, and possessed of the sensible properties of the root. Upon the addition of water to this, a precipitation took place, showing resin to be a constituent.

A peculiar proximate principle has been discovered in the root of *Gentiana lutea* by MM. Henry and Caventou. was induced to try a process similar to theirs with this root, as these plants belong to the same natural family of Gentianeæ, and possess analogous properties in a medicinal point of view.

One ounce of the coarsely powdered root was subjected to the action of sulphuric ether s. g. .73, in a displacement apparatus, by which process a saturated tincture was obtained of a rich straw color; neither litmus nor turmeric paper were affected by it. This was evaporated in a water bath to the consistence of a syrup; after a few hours rest it assumed the appearance of an extract of a bright yellow color, and crystalline in its structure, possessing a fatty, nauseous taste, with but little bitterness. It was then treated with two ounces of alcohol s. g. .84, which dissolved it, with the exception of a small portion of viscid fatty matter, insoluble in cold alcohol and water, soluble in ether and boiling alcohol, which precipitates it upon cooling; it leaves a permanent stain upon paper.

The alcoholic tincture was also of a bright yellow color.

When gently evaporated in a water bath, a yellow crystalline mass appeared, resembling moist sugar. It was acted on by diluted alcohol; a small portion of matter was not taken up, resembling that which was not dissolved in the preceding case; again evaporated, minute crystals of a bright yellow color appeared, possessing no odor, and little if any taste. They dissolve readily in alcohol and ether, and in alkaline solutions, which render them of a deeper yellow color. Hydrochloric acid dissolves them, and at the same time deprives them of color. On the addition of nitric acid a deep blood-red solution is formed; by heating it, nitrous acid gas is driven off, and its red color disappears. Sulphuric acid also turns them to a red color, though not so brilliant as by nitric acid. They are nearly insoluble in cold water, which, however, acquires a milky appearance. Boiling water dissolves a small quantity which is precipitated on cooling.

My attempt to sublime a portion in a glass tube did not succeed; on the application of a gentle heat it melts, and upon reducing the temperature becomes a solid mass of a yellowish-white color, resembling yellow beeswax; it is decomposed by a greater heat, takes fire on the approach of flame and burns with a reddish light, attended with much smoke; a light ash is left which may be dissipated by exposure to heat and air. Its alcoholic solution slightly reddened litmus paper; with a solution of carbonate of potassa there was a slight effervescence; and tincture of muriate of iron caused a deep greenish-black precipitate. From these last experiments I am inclined to believe that this substance consists of gallic acid combined with a yellow coloring principle; from the small quantity obtained, my experiments were necessarily limited, and the properties of gallic acid are very concisely treated of, in the authorities to which I had access.

The extract prepared by boiling an ounce of the root in a pint of water, and evaporating to the solid consistence in a water bath, was of a dark brown color, its taste was at first sweetish, followed by a pleasant bitterness. By this mode two drachms of extract of a consistence to form pills, were ob-

tained from one ounce of the root. That prepared with diluted alcohol in the same proportions, was of a redder color, but not superior in bitterness to the watery extract; nearly three drachms of extract were procured by this process.

My attempts to procure volatile oil by distillation did not succeed. The water, that came over, possessed but little bitterness.

This root is mentioned as an adulteration of the true Columbo (*Cocculus palmatus*,) but may be distinguished from that drug by the want of concentric and radiating lines which mark the latter, and its pure yellow color without a tinge of green. It will be seen from the foregoing experiments, that iodine affords an excellent means of discrimination between these articles. If a fresh cut surface of each of these roots be immersed for a few moments in boiling water, and then touched with iodine or its tincture, a blue compound will be formed with the Columbo, indicating the presence of starch, while the Frasera will not be affected in the least by this reagent. The difference in their specific gravity, may also serve to distinguish them; when thrown into water the Columbo immediately sinks to the bottom of the vessel; the Frasera, from its greater levity, swims on the surface.

From the preceding experiments the root of American Columbo may be supposed to contain Gum or Mucilage, Lime, Carbonate of Lime, Tannin, Gallic Acid, Resin, Fatty Matter, Sugar, a yellow coloring substance, Bitter Extractive, Lignin.

ART. XXXII.—PHARMACEUTICAL NOTICES. NO. XVIII.

By Augustine Duhamel.

Bi-Carbonate of Soda.

As the article of Bi-Carbonate of Soda is very extensively used in this country, and is prepared on a large and economical scale by our manufacturers, it is of the highest importance that our apothecaries should be made acquainted with the method by which it is made. In a communication published in this Journal (vol. 1st, second series) by F. R. Smith, some attention was directed to this subject, by a mention of the fact, that while the different Colleges directed a formula for Bi-Carbonate of Soda, (but resulting in a sesqui-carbonate, as was proved by Phillips, the English chemist,) our manufacturers were engaged in making the article by a novel process which furnished a bi-carbonate with which our shops were then, and are still, supplied. Mr. S. mentioned that it was made by directing a current of carbonic acid gas through dry carbonate of soda, but gave no particulars in relation to the construction of the apparatus. The U. S. Pharmacopœia, under the head of Bi-Carbonate of Soda, directs it to be prepared by transmitting carbonic acid gas through carbonate of soda in solution. The London Pharmacopœia, last edition, gives the same process under the title of Sesqui-Carbonate of Soda. We have, therefore, a formula, authorising, as officinal, a substance not generally, if at all, found in the shops.

The following details, prepared from the formula given in the French Codex, which is that of the manufacturers, and pursued in all the large laboratories of this country, from whence our supplies are derived, convey, assisted by the drawing, all the information necessary to an apothecary to enable him to prepare his own Bi-Carbonate of Soda.

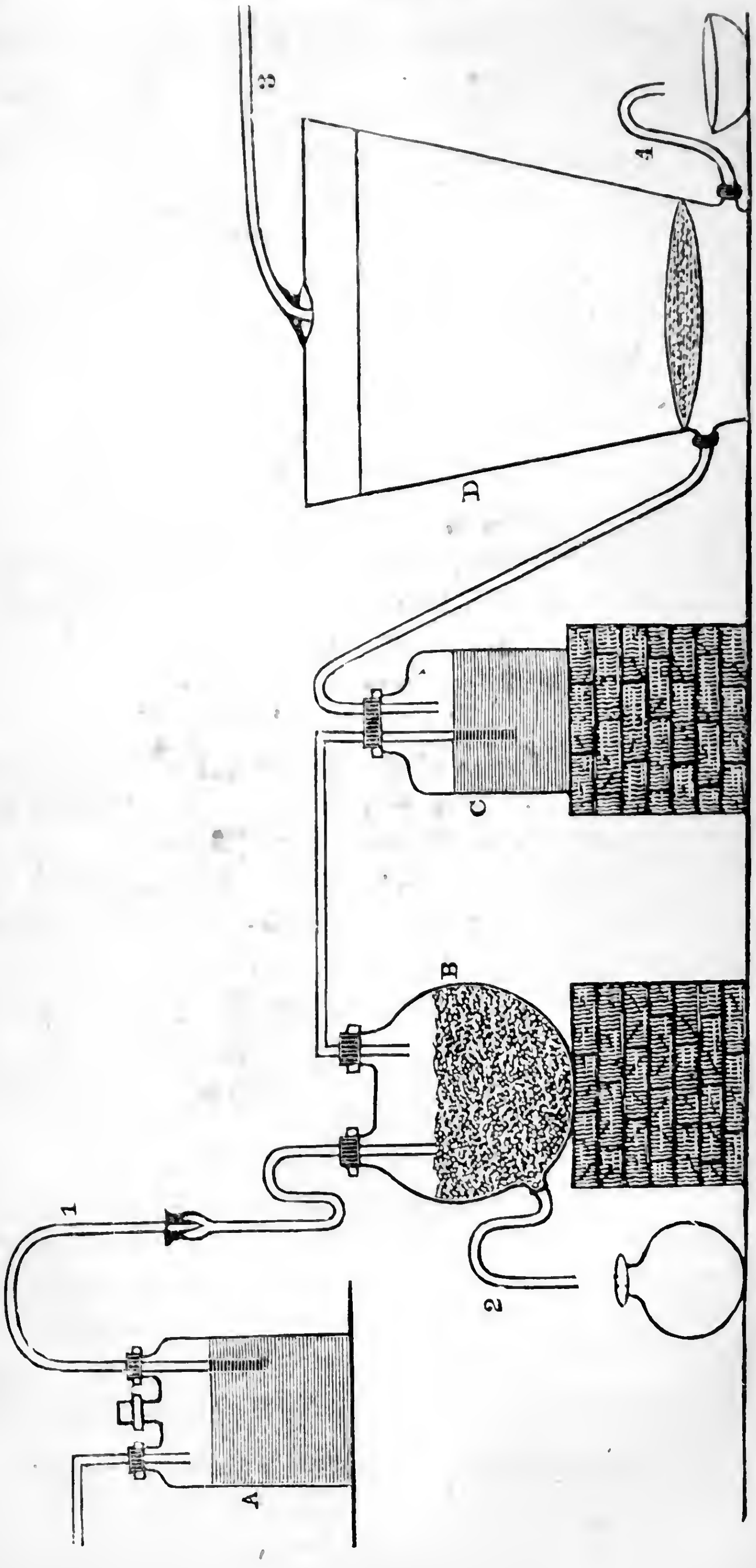
Take of Carbonate of Soda in crystals, any quantity.

Provide a deep wooden box, slightly conical with the narrow part downwards, and furnished at its inferior part with a diaphragm pierced with holes, placed at a little distance from the bottom.

There should be two lateral tubulures, one placed immediately below the diaphragm, and the other very near the bottom.* The interior of this vessel should be covered with lead. Place upon the diaphragm, in a very compact manner, the crystallized carbonate of soda broken into fragments of the size of an inch, so as to almost wholly fill the vessel. Adapt to it a lid fitting accurately, and furnished with an opening through which a communication by means of a tube may be made between this and a similar vessel containing also crystallized carbonate of soda: fasten the lid with strong luting. Adapt to the inferior tubulure, a glass tube, bent at right angles, which will present the means of drawing off the liquid which accumulates during the operation, without the trouble of dismounting the apparatus; for this purpose all that is necessary is to place the free branch vertically, and direct the opening downwards. If, on the contrary, the opening is directed upwards, the liquid ceases to flow, and the interior of the apparatus is no longer in communication with the air. The tubulure placed immediately under the diaphragm, is likewise provided with a tube intended to connect this first vessel with the apparatus for generating the carbonic acid gas.

This last apparatus consists of two vessels of glass or stone ware, of about equal capacity, together with a bottle for washing the gas. Fill one of these vessels with hydrochloric acid, diluted with two or three parts of water, and the other with marble, broken in pieces. This second vessel should be furnished at its inferior part with a tubulure, to which may be adapted, by means of a good cork, a tube bent at right angles, so as to be able at will to remove the solution of chloride of calcium produced during the operation, without disturbing the apparatus. The acid bottle should be placed upon an elevated support, so that its inferior part should be upon a level with the superior part of the other vessel. From this last there sett off two tubes, the first to convey the carbonic acid gas into the wash-bottle containing water, from whence it is

*In France they employ vessels of stone ware, which are made expressly for this use.


A
B
C
D
1
2
3
4

transmitted to the vessel containing the carbonate of soda by means of a tube fixed to the opening near the diaphragm: the second tube destined to bring the hydrochloric acid upon the marble, should be bent S form, and widened at its superior part: place it vertically in the customary manner. Plunge into the S tube a syphon, starting from the acid reservoir, and let its longest branch (that which is plunged into the S tube) be terminated by a capillary opening, so that when the syphon is exhausted of air, the acid will pass drop by drop.

When the apparatus begins to work properly, it may be left to itself for a length of time proportioned to the capacity of the vessel serving as the reservoir. The solution of chloride of calcium is to be removed every day, by means of the tube attached to the inferior part of the vessel containing the broken marble: operate in the same manner for the liquid which runs from the crystals, according to their degree of saturation. Be careful to renew the acid and marble when necessary.

The carbonate of soda of the first vessel is perceived to be saturated, when the water begins to run from beneath the crystals contained in the second vessel. At this point suspend the operation by removing the syphon which conducts the acid. The luting being now taken away, and the lid removed, the Bi-Carbonate of Soda is exhibited in the form of skeletons of the original crystals of soda, loosely arranged and possessing a snow white crystalline appearance.

Nothing farther remains but to place it upon frames, covered with paper, and to dry in a stove.

Reference to the Apparatus.

A, diluted acid,
B, marble.
C, water to wash the gas.
D, carbonate of soda.
1, syphon.
2, tube for removing muriate of lime.
3, tube connecting with second box.
4, tube to draw off the water.

Cyanuret of Silver.

This article, which is used for the extemporaneous production of hydrocyanic acid, is officinal in the New London Pharmacopœia, and is likely to be included among the number of new preparations proposed to be introduced into the forthcoming edition of the U. S. Pharmacopœia. There are three methods of obtaining this substance. The first is that of the London, which is to decompose nitrate of silver in solution by dilute hydrocyanic acid. The second is the most eligible method for manufacturers, and consists in directing, through a solution of nitrate of silver, a current of hydrocyanic acid gas, until it ceases to throw down a precipitate. The gas is obtained by treating prussiate of potash with sulphuric acid in a glass retort; which should be connected by a glass tube with the vessel containing the solution of silver. The third method, which I am about to detail, offers a ready means of obtaining this substance, wherever perfectly dry, undecomposed cyanuret of potassium can be procured.

It is as follows:

Take of Cyanuret of Potassium, 5 drachms or 15 parts; Crystallized Nitrate of Silver 11 drachms, one scruple, 34 parts; distilled water 16 ounces or 384 parts,—by measure.

Dissolve the two salts separately, in the distilled water; mix the solutions together, stir with a glass rod, then throw upon a filter, and wash the precipitate with distilled water; lastly dry the cyanuret in the dark, by the gentle heat of a stove.

Composition.

1 eq. Cyanogen	26.436	or 19.4.
1 " Silver	108.305	" 80.6.
	134.000	100.0.

Iodide of Arsenic.

This combination is prepared according to Plisson, by digesting three parts of arsenic in fine powder, with ten parts

of Iodine, and 109 parts of water until the odor of Iodine is no longer manifested.

The clear liquid is then decanted and submitted to evaporation: at a certain degree of concentration, the Iodide is produced in the form of red crystals, or the solution may be evaporated to dryness, and then sublimed in close vessels without decomposition. It may be made to combine with a new portion of Iodine. Water in large quantity dissolves it without any residue, but when digested with a small quantity it decomposes, forming hydriodic acid in solution and white crystalline scales, composed of water, acid, and iodide in variable proportions. Latterly it has been employed in Europe as a medicine. It is a powerful poison. An extemporaneous preparation combining the virtues of both of these active substances, has been used successfully in this city. It is formed of—

Lugol's Solution of Iodine, ℥i.
Fowler's " " Arsenic, ℥iv.

When mixed together in these proportions a change is observed in the appearance of the mixture, which is, in an instant, rendered almost colorless. The dose is five drops.

Syrup of Morphia.

Sulphate of Morphia gr. viij.
Syrup " 8oz.

Dissolve the Morphia in the Syrup, with a few drops of diluted sulphuric acid.

This is not an officinal preparation, and consequently possesses a very indefinite character as found in the shops. As physicians occasionally prescribe it, it should be of determinate strength. The same discrepancy occurs in relation to the strength of the solution of morphia, although, officinal in the American Pharmacopœia. In some parts of the country it is made in the proportion of 1 gr. to the ounce, as in this city, while in other places it is always made and understood to contain 8 grs. to the ounce.

The proper strength of the syrup should be 1 gr. to the

ounce. It is intended by some physicians as a substitute for the weaker solution of morphia, in being more palatable: besides the solution very soon decomposes, and becomes covered with a mucilaginous film, which can only be avoided by adding a few drops of alcohol; this however, is objected to, on account of the taste.

ART. XXXIII.—ON THE TARTRATE OF IRON AND POTASSA.

By William Procter, Jr.

This preparation has been much neglected, doubtless on account of the difficulty of obtaining it of a good quality. Many processes and formulæ have been published for its manufacture, but hitherto, none without objections. According to the Edinburgh and Dublin Pharmacopœias, metallic iron is mixed with bi-tartrate of potassa and water, and the mixture exposed to the air for several weeks, during which the iron becomes peroxidized, and united with the excess of acid in the bi-tartrate. By solution and evaporation a double tartrate of iron and potassa results. If no other objection could be urged against this process, the length of time required renders it ineligible.

Our Pharmacopœia of 1830, directs precipitated carbonate of iron to be boiled with bi-tartrate of potassa, and the solution which contains the double tartrate is evaporated to dryness. In this process the objection is that the sesquioxide of iron is not presented in a state favorable to ready combination, and but a small product is obtained.

The late London Pharmacopœia, (1836,) contains a process of which the following is a sketch. Sesquioxide of iron, (the precipitated carbonate of our Pharmacopœia,) is dissolved in hydrochloric acid; the solution thus formed mixed with a large quantity of water. The sesquioxide of iron is then

precipitated from the solution in the state of a *hydrate*, by the addition of solution of potassa, and washed with pure water until deprived of adhering saline matter. This hydrate of the sesquioxide of iron is then boiled with bi-tartrate of potassa until it is dissolved; the solution, filtered and evaporated to dryness. If, after the solution of the hydrated oxide, the liquor is acid, solution of sesqui-carbonate of ammonia is directed to be added until it is neutral.

The salt thus obtained has a dark olive green color, is very deliquescent, and when an attempt is made to dissolve it, an insoluble residue remains, which is most probably the proto-tartrate of iron.

In repeating this process it has been found that more than a twenty-third of the bi-tartrate remains undissolved. Though at first deliquescent, this salt after standing three months became of a mottled, light green color, and was much less soluble than when first made, and had an ammoniacal odor. This is accounted for, by supposing the decomposition of the tartrate of ammonia, formed by the addition of the sesqui-carbonate of ammonia to neutralize the acidity of the solution. Its insolubility is doubtless due to the conversion of the per-tartrate of iron into a *proto*-tartrate by a new arrangement of its constituents, a change, which, according to Soubeiran and Capitaine, it is liable to undergo. This preparation, according to Phillips, has the following composition, viz.:

½	an atom	sesqui-oxide of Iron	40	=18.18
1	"	Potassa, . .	47	=21.36
2	"	Tartaric acid,	133	=60.46
1	"	Tart. of Iron and Potassa,	220	100.00.

Hence the oxygen in the oxide of iron is to that in the potassa as 1.5 to 1.

In a paper published originally in the *Jour. de Pharm.*, and republished in the April number of this volume, by Soubeiran and Capitaine, the outline of a process is given for the preparation of tartrate of iron and potassa in a way

that the product contains a much larger quantity of iron than that of the London process.

The conditions necessary to bring about their result, are that bi-tartrate of potassa be placed in contact with an excess of hydrated sesquioxide of iron, and that they be exposed to a temperature not exceeding 140 degrees Fahr., for 24 or 30 hours. The following formula is founded on the idea suggested in that paper, and the excellence of the product which it yields, renders it deserving of the attention of pharmaceutists, viz.:

Take of, Precipitated Carbonate of Iron, three ounces,
Hydrochloric acid, ten ounces,
Bi-tartrate of Potassa, seven ounces and a half,
Water, a gallon and a half,
Solution of Potassa, five pints and a half,

Mix the precipitated carbonate of iron with the acid, and digest for an hour, or until the former is dissolved, and then pour the solution into a gallon of the water, and strain, if necessary. To this add the solution of potassa, wash the precipitate frequently with water, until the washings are wholly without taste, and while yet moist, mix it with the bi-tartrate of potassa, and half a gallon of the water. Keep the mixture at a temperature between 130 and 140 degrees Fahr. for thirty hours in a glass vessel, occasionally stirring, then filter the solution through paper, and evaporate to dryness by a similar heat, applied by means of a water bath.

It has been found, in repeating the above process, that the required temperature may readily be regulated by putting the mixture in a glass jar and placing it in a metallic vessel on a support, which vessel is then to be nearly filled with water. A thermometer should be suspended in the water, and heat applied by means of an alcohol lamp, until its temperature rises to 145 degrees; then by regulating the flame for half an hour it can easily be ascertained how large it is necessary to be, to keep up the required temperature, and the whole operation may be left to proceed for hours without any other attention

than an occasional agitation of the mixture in the interior vessel. Indeed in one instance the process was left in operation for seven hours, without the thermometer having risen higher than the required temperature, thus showing that what appears to be a troublesome piece of manipulation, is really very simple and easy. According to Soubeiran and Capitaine, the composition of the salt, when thus prepared, is as follows:

1 atom	Sesquioxide of Iron,	80	= 30.77
1 "	Potassa,	47	= 18.07
2 "	Tartaric acid,*	133	= 51.16
1 "	Tart. of Iron and Potassa,	260	= 100.00.

In this it is evident that the oxygen in the oxide of iron is to that in the potassa as 3 to 1. In the salt thus prepared there is forty per cent. more iron than in that previously described. Its color is dark brown, but when held in laminated pieces, between the eye and the light, it is ruby-red; it is perfectly soluble in water, with which it forms a dark brown transparent solution, and requires about four times its weight of that fluid at 60°, for solution. When this saturated solution is boiled it deposits a black matter, which is owing, according to Soubeiran and Capitaine, to the reduction of some of the oxide of Iron and the consequent decomposition of a portion of the salt. This preparation has less of the peculiar inky taste of ferruginous salts, than many of the compounds of iron; it contains thirty per cent. of sesquioxide of iron, and undoubtedly is one of the best preparations of this class. Like tartrate of antimony and potassa, this salt, is precipitated from its aqueous solution by an excess of alcohol, and in the form of a brownish yellow colored powder, which is as soluble as before. Owing to its insolubilily in alcoholic menstruua, it is necessary to dilute wine before it will take up sufficient to make a wine of iron of sufficient strength. One part of Madeira wine and as much water will dissolve about 1-21st of its weight of the salt, which is about a scruple to the ounce.

* The atom of tartaric acid in the paper of Soubeiran and Capitaine before alluded to, represents two, according to Turner.

In conclusion, it is observed, that the excellence of the product furnished by this process, has caused it to receive the sanction of the committee of the Philadelphia College of Pharmacy, now engaged in revising the formulæ of the United States Pharmacopœia.

ART. XXXIV.—ON PEPSINE, THE PRINCIPLE OF DIGESTION. By M. Wasmann.

In very extensive detail, M. Schwann has demonstrated that the gastric juice contains a peculiar principle, which he denominated *Pepsine*, although he had not obtained it in a pure state. M. Wasmann has succeeded in isolating this principle, which he considers to be contained in the grumous matter which fills the internal cells of the glandular membrane of the stomach.

M. Wasmann prepares Pepsine in the following manner: he washes the membrane, and digests it in distilled water, at the temperature of 30° to 35° c.: several hours after, he decants the liquid, and again washes the membrane with cold water, until it exhales a putrid odor. These liquors, mixed and filtered, yield a transparent, somewhat viscid liquid, possessing eminent digestive powers, especially when acidulated with hydrochloric acid. To procure the pepsine in a pure state, acetate of lead is to be added, the precipitate washed, suspended in water and decomposed by a current of sulphuretted hydrogen gas. The liquid separated from the new precipitate is acid and colorless. It is now evaporated to a syrupy consistence, at a temperature not exceeding 35° c., and absolute alcohol added, by which an abundant flocculent precipitate is produced, which when carefully dried assumes the form of a yellow, gummy matter, not attractive of moisture; this is the pure pepsine of M. Wasmann.

This substance is soluble in water, which it renders acid,

because it obstinately retains a certain quantity of acetic acid. A solution containing only $\frac{1}{50000}$ of pepsine, dissolves, in six or eight hours, the white of an egg slightly acidulated; but it loses its digestive power when boiled, or when saturated with potassa. In the latter case it deposits flocculi, which are insoluble in water, and slightly soluble in dilute acids, forming liquors of feeble powers.

Pepsine is recognised by forming, with acids, precipitates which are soluble in an excess of the acid. It is distinguished from albumen by the precipitates which acetic and hydrochloric acid occasion in its aqueous solution; and from caseum, by the ferrocyanide of potassa not precipitating its acid solutions.

A concentrated aqueous solution of pepsine is troubled by bichloride of mercury and acetate of lead, which form precipitates, soluble in an excess of the reagent, and in the acetic and hydrochloric acids. The sulphate of the protoxide and sesquioxide of iron, and the chloride of tin, likewise precipitate pepsine, and all the precipitates formed with metallic solutions possess the digestive properties.

When burnt, pepsine gives off the odor of burnt horn, and leaves a charcoal, difficult to incinerate, in which is to be found lime, soda, phosphoric acid and some iron.

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ART. XXXV.—ON RUNNET AND CHYMOSINE.

By M. DECHAMPS, Pharmaceutist at Avallon.

THE runnet which is used in the neighborhood of Avallon to curdle the milk, is prepared in several manners ; the most common is made with the stomach of the calf; sometimes, however, the mucous membrane of the stomach of the hog is used.

If we examine the books to know what runnet is, we read, that the matter which is found in the stomach of ruminating animals is so called; or rather, that runnet is that which serves to curdle milk, as the flower of the artichoke, and the acid liquor which comes from the stomach of calves, kids, &c., because it thickens and curdles the milk. M. Berzelius, in his chemistry, applies this name to the mucous membrane of the stomach, and supposes that this membrane contains a peculiar matter which causes the milk to curdle.

This difference of opinion, the remarkable action of runnet, and its activity, attributed by some to the acid which it contains, and by others to a peculiar matter, excited me to undertake a series of experiments, tending to discover, if possible, the active principle of the runnet.

I prepared liquid runnet with alcohol of 27° c. and the stomach of a calf ; eight drops of this runnet were sufficient to curdle a pound of milk.

This runnet was placed in a retort and distilled; the product was collected in a receiver, cooled by a current of water. The distilled liquid was slightly acid and had the odor of runnet. The residue was foul and very acid; its odor was that of cooked cheese.

I placed 750 grs., of milk in three vessels; I added to the first, five drops of the distilled liquor, to the second, five drops of the residue, and to the third, five drops of the distilled liquor, and five drops of the residue ; no effect was produced.

I exposed to the solar rays, in the month of June, some runnet enclosed in a flask ; it became foul and lost its action in milk.

I evaporated to dryness, 30 grs. of runnet, over sulphuric acid, and obtained a very active runnet.

Ten drops of runnet, put into 125 grs, of boiling milk produced no action.

I mixed 15 drops of runnet with 125 grs. of cold milk, and carried it to the boiling point as soon as possible; the milk was not altered.

Some runnet was saturated with calcined magnesia, three drops coagulated 250 grs. of milk.

I made the runnet alkaline with bi-carbonate of soda, and poured it into some milk; coagulation ensued.

I placed some runnet in a matrass, and heated on a salt-water bath; it began to loose its clearness at 45° c., and the cloud increased up to 60° c. Three drops of runnet, at 45° c., and eight drops, at 50° c., each separately, coagulated 125 grs. of milk. The coagulation with the latter, was more slow than with the former; the slowness of the operation is indicated by the amount of cream which separates. A coffee spoonful of the runnet, heated to 60° c., caused no change in 125 grs. of milk.

To ascertain which portion of the stomach produces the runnet, I dissected off the mucous membrane from a stomach, and placed the serous united to the muscular membrane, in 300 grs. of alcohol of 47° c.; after a maceration of three months I mixed, without any result, 20 grs. of this liquor with 125 grs. of milk. The mucous membrane was placed in 130 grs. of alcohol, of 27° c. After a month's maceration, the liquid had but a feeble action, for it required 20 drops to coagulate a pound of milk. I placed in the flask a little chloride of sodium, and obtained an active runnet; one drop coagulated 170 grs. of milk.

The mucous membrane of the stomach of a calf, which had been macerated in 375 grs. of alcohol of 27 c., and which produced a feeble effect; was withdrawn from the flask after macerating one month, was washed and placed in a flask with alcohol of 27° c. and 6 grs. of salt; the next day three drops coagulated 250 grs. of milk.

The mucous membrane of the stomach of a calf was exhausted* by macerations in alcohol and in water. The first was made with 800 grs. of alcohol, of 27° c., for seven months. The second were continued with 8000 grs. of water, and did not last more than twelve hours each. After this, the mucous membrane was dried; it no longer reddened litmus paper, when pressed on the moistened inner membrane. A part of this dried membrane was placed in 1800 parts of unskimmed milk, and the temperature raised to 50° c.; at 45° c. the coagulation was complete. The membrane was separated, washed, dried, and weighed; there was no loss. This membrane was placed in a quantity of milk equal to the former, the milk was heated to 50° c., and, as should happen, there was no action.

Boiling milk was not altered when I placed in it the exhausted mucous membrane.

Having ascertained that the active principle of runnet was produced by the mucous membrane of the stomach, I examined whether any other portion of the digestive tube contained it, and whether this matter was peculiar to the mammalia. It resulted from these researches, that this matter was not contained in any other part; that it does not exist in the craw of the Gallinaceæ, but that it may be found in the mucous membrane of the gizzard of these animals, &c., that it is peculiar to the stomach of all animals, (I generalize by induction,) and that its functions are essential for digestion, inasmuch as it favors chymification.

Liquid runnet is slightly amber-colored, when prepared with the stomach of a calf and alcohol of 27° c. Its odor is like butter, and its reaction with test paper is acid. When saturated it becomes foul and disengages ammonia. When saturated with ammonia and filtered, there is obtained a transparent liquor with the odor of runnet, but which has no action on milk, for six coffee-spoonfuls had no effect on 125 grs. of milk. If the filtered liquor be set aside in a corked flask, it deposits

* This experiment differs somewhat from that of M. Berzelius.

on the sides of the flask small crystalline grains, which are composed of phosphate of lime, and phosphate of ammonia and magnesia; the filtered liquor was acidulated with tartaric acid, introduced into a retort, and distilled so as to obtain 500 grs. of product. These 500 grs. were saturated with ammonia, and 250 grs. were distilled over; the residue was neutral; tartaric acid was added, and the distillation continued. These two products were saturated with potassa, and evaporated; they contained, the first, capric acid, and the second caproic and butyric acids. In another experiment, the first distillation was continued to obtain a greater quantity of product, and contained capric and caproic acids, while the second contained butyric acid.

Runnet contains:

Hydrochloric acid in large amount.

Butyric "

Caproic "

Capric "

Lactic "

Hydrochlorate of ammonia.

Chloride of Soda, independent of any added, but the addition of this salt augments the secretion of the hydrochlorate of ammonia.

Magnesia, not as an ammoniaco-magnesian-phosphate.

Soda, probably with the magnesia, as a lactate.

Traces of a sulphate.

Phosphate of lime.

And a peculiar matter, which I name *chymosine,* from χυμος, chyme; χυμωσις, chymification.

To obtain impure chymosine, a small excess of ammonia is added to runnet. The precipitate is filtered, washed and dried. Dry chymosine resembles gum, or emulsine. Hydrated or dry, it is insoluble in water; its insolubility is so great, that after being immersed several hours, it may be powdered under this liquid; but it is soluble in acidulated water. This solution exercises the power of curdling milk, but is not as

energetic as runnet; that is to say, the quantity of chymosine extracted from a given amount of runnet, will not reproduce the same amount of runnet. This action proves only that the property is not destroyed in chymosine when isolated.

Water acidulated with sulphuric acid, &c., separates from the chymosine the phosphate, which precipitates with it.

A solution of chymosine is precipitated by all the alkalies, the carbonates of potassa and soda, ammonia, and by tannin.

Iodic acid is decomposed and iodine liberated, when poured into this solution.

Chymosine burns with flame, and leaves a brilliant charcoal.

I may conclude from the preceding statements :

That the name runnet applies to the mucous membrane of the stomach ;

That runnet may be concentrated without alteration ;

That runnet does not act upon milk in consequence of the acid which it contains, because it operates after saturation, because the heat of the solar rays, and a temperature of 60° c., deprive it of this power, and because heat produces on the mucous membrane an effect similar to that upon runnet ;

That chymosine is the active principle of runnet ;

That the action of isolated chymosine cannot be attributed to the acid used to dissolve it ;

That chymosine is secreted by the mucous membrane of the stomach ;

That the quantity of chymosine necessary to coagulate 1000 grammes of milk is excessively feeble, since it may be effected by eight drops of liquid runnet, and since a portion of mucous membrane of the stomach of a calf, perfectly exhausted, did by the assistance of 45° c., coagulate 1800 grammes of milk ;

That the acidity of the runnet favors its action;

That a temperature of 20° to 25° c., is very favorable to the action of runnet ;

That chloride of soda acts as a stimulant on the mucous

membrane of the stomach, and this action augments the secretion of chymosine ;

That the action of chymosine cannot yet be explained, and that, saying that the caseous matter undergoes an isomeric change through the influence of chymosine, or that the action takes place in consequence of a catalytic force, only sets the mind at rest, without explaining the phenomena.

I have given the name of *chymosine* to the matter secreted by the mucous membrane of the stomach, because this name reminds only of chymification ; or the first part of digestion, while the word peprine (pepsine ?) recals the idea of digestion as a whole, that is chymification and chylification; also because we perceive the aliments converted into chyme, but are not able to detect the passage of chyme into chyle.

If we may apply to living organs, observations made on these organs after the death of the animal, it will be easy to explain some parts of the phenomena of digestion.

When an animal takes into its mouth, nutritive matter, the digestive apparatus is excited, the saliva flows, is mixed during mastication with the aliment which its renders alcaline. Mastication completed, these matters enter the stomach, meet the gastric juice by which the free soda is converted into chloride of sodium. This chloride excites the action of the mucous membrane and increases the secretion of chymosine, which finds a solvent in the excess of hydrochloric acid contained in the gastric juice. The matters accumulated in the stomach, are agitated by the movements of this organ, penetrated by the gastric juice, and gradually converted into chyme, under the influence of the temperature, the chymosine and its solvent. This operation finished, the chyme passes the pylorus, and mixing in the duodenum with the pancreatic and hepatic secretions, is necessarily modified by their action, previous to being offered to the lacteals. If any disease should change the chemical nature of the secretion from the mucous membrane of the stomach, the chymosine would be without action ; for though secreted, it would not meet with a liquid capable of precipitating it, and digestion would not proceed properly; on

the contrary, if the acidity of the gastric juice is too great, this liquid would exercise too much action on the mucous membrane, and the animal would be harassed, &c.

This theory, it is true, does not explain all the phenomena of nutrition ; but it accounts with probability for the use of the saliva in digestion ; for it appears impossible to admit the principle, that the free soda of the saliva acts as a solvent of the aliments, since, as in man, these matters remain but a short time in the mouth, and pass without stopping into the stomach, where they meet an excess of hydrochloric acid, and the alkalies cease to remain uncombined. For those animals, which like the Ruminatia, have several cavities, in which the aliments remain, this explanation is more easy of adoption, but as the food of these animals are of difficult digestion, it is necessary to retard its entry into the stomach, that it may be the more effectually divided and softened, before it is offered to be converted into chyme, and these macerations do not sustain the dissolving theory, although supported by the solution of vegetable albumen, since this solution takes place, according to the experience of the laboratory, without the presence of an alkali.

In the Gallinaceæ, &c., the nutritive matters remain a long time in the crop, before they penetrate the gizzard, and in their passage meet with an acid liquor only.

This theory, which is corroborated by the use of sea salt in the preparation of our aliments, by its well established digestive action, and by the presence of hydrochloric acid, and chloride of soda in all stomachs, explains also in an indirect manner the action of bi-carbonate of soda in difficult digestion ; for this salt acts upon the acid, by means of its base, and by the resulting chloride of soda, and not by a solvent action, since this is not more probable than the solvent action of the saliva in mastication.

Journ. de Pharm.

ART. XXXVI.—ORGANIZATION OF PHARMACY IN NORWAY.

By M. MARTINS.

IN Norway, as in Denmark and Germany, the number of shops are limited, so that he who exercises the profession of an apothecary, can support himself in an honorable way, without being constrained to falsify his medicines in order to obtain subsistence. It has been established as a principle, that one apothecary should administer to 10,000 people, and as Norway is little inhabited in proportion to its extent, there are but *thirty-five* apothecaries in the whole kingdom; eight in the cities of Christiana, Drontheim, Bergen, and Christiansand; the others are distributed in the small towns and villages.

The privilege of a shop, once accorded by the state, cannot be taken from the proprietor, but by a decree of the competent tribunals, in the case of his having proved unworthy of exercising his profession, either by selling altered drugs, or in any other way. The privilege is then transferred to another apothecary, in whom unite all the conditions imposed by law. Except in these cases, which are very rare, the children, the pupils, or even strangers succeed to the right. The number of apothecaries being very small, the value of a shop, varies from fifty thousand francs, to one hundred thousand, comprising the house and stock. The payment is at intervals, and as the possessor is certain to prosper, it often happens that a young apothecary, without fortune, can acquire a shop of high cost. The right is also possessed of conducting the establishment by a provisionary title, which places it in the hands of a son, to exercise his profession, when he is of age, and has furnished proof of capacity.

It was necessary to avoid the abuses which appertain to a right possessed by apothecaries, in most countries, of fixing themselves the prices of medicines, which price is lowered by competition. This is remedied by establishing a tariff, which is accomodated to the fluctuation of prices in simple

drugs; and secures to the apothecary a profit of one hundred and twenty-eight and four-sevenths per cent. This profit is not too great, if it be recollected, that in Norway the navigation is interrupted during eight months of the year, and that then the apothecary is forced to have all the substances which in other countries are bought ready prepared by the chemical manufacturer. The law states expressly that chemical substances, salts for example, must be prepared by the apothecary, which affords a guarantee to the buyer, and also contributes to the instruction of the pupils. It is true, nevertheless that the apothecaries of Norway, have commenced to procure their products ready made from Hamburgh, or the manufactory of Schohenbeck, near Magdebourg. The government itself has produced this result, by taking as the basis of prices, the price current of Hamburgh; which prevents the apothecary himself from manufacturing, as he could not compete with the manufacturers' prices. It was in 1813, that the profit of the apothecary was fixed at the sum stated above. To establish it, the charges which weigh upon the apothecary are taken, the estimation of which appears to us so curious, that it is proper to report it. Rent and utensils 6,000; maintainance, 1,000; three pupils, 2,000; wages of workmen and boys, &c., 4,500; lights and fuel, 1,000; loss on merchandize 600; taxes, 1,000; expenses of the apothecary, 6,000; purchase of medicines, 17,500;—total, 40,000 francs. M. Martins enters into circumstantial details upon the principal rules which have been established, to calculate the price, either of simple medicines or compound substances, or lastly of chemical compounds, which is much more difficult.

The appearance of homœopathic medicine, which in all countries has caused some injury to pharmacy, but only for a short time, has caused in the regulations a modification which went into operation in September, 1830. Sixteen and two-thirds per cent. were added to the disbursements of the apothecary, so that a medicine, which in Hamburgh cost 100 shillings, would sell for 355 in Norway.

Although the whole of these arrangements reconcile the

interests of the public and those of the apothecary, they give rise nevertheless to some abuse. The price of dear substances, such as musk and opium, is still above the profit allowed by law to apothecaries; it results from this, that the merchants bring large quantities, which they sell in secret. This abuse has led to the idea of adopting the Prussian tariff, in which all medicines are arranged according to their value, and according to the more or less frequent use of the medicine. The establishment makes a large profit upon the products which are little costly, and used in small doses; its gain upon the dear articles is on the contrary very small. The interest of the apothecary, and that of the patient, is to use medicines of a moderate price, in all cases where high priced substances can be substituted by others of less cost.

To compensate for the charges imposed upon apothecaries in Norway, there have been accorded to them some privileges. They can sell, at 20 per cent. reduction, medicines to physicians who practice in the scattered villages, and who themselves are forced to furnish them. The medicines for the use of the hospitals are bought without any reduction, because, as it is thought that the increase of these establishments diminishes the number of patients, it was but just that the interests of the apothecary should not suffer. If there are two apothecaries in a town, they furnish by turns the medicines to the hospital.

With such securities, the apothecary in Norway is sure of an honorable living; and the physician and the patient can depend upon the efficacy of medicines. "Without doubt," says M. Martins, "some abuses exist as elsewhere, but they are inconsiderable in comparison with those under which we groan in France; they are confined to these, that one apothecary will make greater weight than another, or will endeavor to insinuate himself into the good graces of the physicians; but each of them being sure of making a living for his family, no one would have recourse to *lying publicity* or to shameful manœuvres to take advantage of depravity, ignorance, or credulity.

The physicians of the cantons, are charged with overlooking the apothecaries. Every drug of bad quality, or falsified, is immediately destroyed; if directions are badly executed the apothecary is fined, the same is the case when he gives energetic medicines, or delivers written consultations. The first fine is 500 franks, the second 1,000. He is forbidden to sell secret remedies, and to advertise them. It is seen that in this point of view Norway is more advanced than France, as no where are seen those disgraceful and scandalous placards which place the profession of pharmacy in so unfavorable a light.

For selling medicines without the privilege of an apothecary, the individual is punished with imprisonment, from a month to six months. He who practises this profession is certain of possessing an honest competency at the termination of his career, if he strives to merit the confidence of the public, which is accomplished by honorable means. The shops of Drontheim are characterized by admirable simplicity; no paintings upon the walls, no signs upon the windows, nor that ruinous ostentation which is met with in our shops.

The following is the law which regulates the study of pharmacy; it is necessary that it should be as wise and perfect as that which regulates the exercise of the profession. The studies have been organized conformably to a law which dates from 1672, and which still regulates them. The élevès must be chosen from those who have studied in the secondary schools, and who are consequently familiar with Latin. They commence in the shops by learning the price of medicines and the elementary principles of the Pharmacopœia; still later, they put up prescriptions under the direction of the assistants. When the apothecary has become familiar with their capacity, he gives to them a certificate, with which they present themselves before the physician of the district, who examines them, and presents them with a testimonial by which they are declared capable of exercising the functions of assistant in a shop. In this arrangement there is an evident defect, for the physician is not always a good judge in matters

of chemistry, of pharmacy, and natural history. On this plan also, there is taken from the apothecary a right, which ought to belong to him, since it is under his jurisdiction that the assistant obtains a situation. After having performed the offices of a shop for instruction, the pupil proceeds to Christiana to follow a special course, and finally to appear before a board, who subject him to every method of examination.

The written trial consists in the description of one or more preparations and the phenomena which accompany them. If the trial is not satisfactory to the examiners, the candidate is sent back for a longer or shorter time. The verbal examination has for its objects, botany, zoology, mineralogy, chemistry, pharmacy, the laws which govern it, the mode of preparation and purchase of substances. It is requisite in addition that the pupil should recognise and name the simple drugs, which are presented to him ; the practical trial consists of the preparation of a medicine and the chemical analysis of a body. In the certificate, which is delivered to the candidate, it is specified whether his examination has been good or indifferent. This certificate confers the right of practising pharmacy in the whole of Norway and of buying a shop.

The first obstacle which the re-organization of pharmacy met with in France, arose in a great measure from this, that as all the professions were free, the number of shops could not be limited. It has been asserted, that to wish to do this would be to bring back the establishment of those rich and powerful corporations which have existed even to the last century, and of which the creation is repugnant to our constitutional principles. We must confess that this is an objection which is not easily removed.

Without hesitation, we cannot but admire with M. Martins, the instruction and noble simplicity of the apothecaries of Norway, who not having to fear failure, devote themselves entirely to the exercise of a profession, which they so well know how to ennoble. But we must also remark that their position has no analogy with that of the French pharmaciens. These obliged, like other professions, to struggle with

competition, have too often recourse to means which disgrace the character of men pursuing the study of the most attractive natural science. Pharmacy, unhappily, has been coerced to submit to the common law which regulates other professions; there have been established cheap shops, which lead the public to believe that if the price of medicines is so high, it is because the persons who sell them wish to receive too much profit from them. If the public mind, so bad a judge in this matter, has become once thus possessed, it will happen that pharmaciens, the most devoted to their art, and the most disinterested, will experience the common destructive influence.

Journ. de Chimie Medicale.

ART. XXXVII.—ON PAULLINIA, A NEW MEDICINAL SUBSTANCE. By Dr. Gavrelle.

Paullinia is an extract from a plant of the same name, originally from Brazil, which extract is prepared by the Indians, and appears to possess a very energetic stimulating action. M. Gavrelle has presented a specimen to the Society of Medicine, together with a new alkali, which two chemists of Paris had separated by analysis. The extract and alkali are very bitter and exhibit great analogy with caffein.

It is probable that Paullinia, or the extract which bears this name, is extracted from several plants of the genus Paullinia, which contains thirty-one species, and is of the natural family Sapindaceæ; and Octandria, Triginia, in the artificial arrangement.

This genus has received its name from being dedicated to Simon Paulli, a physician and botanist, who was born at Rostook in 1603, and died at Copenhagen in 1780. This physician was the author of several works, and more notably of *Quadripartitum de Simplicium Medicamentorum Facul-*

tatibus, 1668, in 4to.; a work upon the abuse of tea, tobacco, &c.

Paullinia Africana is employed in Senegambia to arrest hæmorrhage, by the application of the powdered bark to the wounded parts. The bark of the *P. Asiatica* is used at Bourbon as a febrifuge ; in India, the bark, the leaves, and the fruit, are employed as a decoction, prepared with four grammes of these substances, as a remedy for venereal complaints, rheumatism, gout, and cutaneous affections.

The seeds of *P. cupana* are used by the Indians of Oronoko; they mix them with cassava and water, and leave them in contact. When the liquid mixture begins to putrefy, which is denoted by becoming of a yellow color, and acquiring a bitter taste, they draw off the clear portion and mix it with the water which serves for their common drink.

P. Mexicana possesses, according to Hernandez, the properties of sarsaparilla.

The seeds of *P. pinnata* are stupifying; they answer in Brazil and the Antilles to poison fish. The leaves of Paullinia are, according to Pitron, vulnerary. The *P. serjania* also furnish seeds, which produce drunkenness.

Finally, according to Martins, an extract is prepared from the *P. sorbilis*, known in Brazil under the name of *guarana*, which is a medicine composed by the Indians of Para, and is made up by them in the form of lozenges, weighing 125 to 250 grammes.

The color of the guarana is brown, and in the mass is composed of lumps which are less colored interiorly than on the surface. This product is hard, very light, inodorous, and of a slightly bitter taste, without any sensible astringency. Gomez states, that the guarana is efficaciously used in Brazil for dysentery, and for diseases of the urinary passes produced by relaxation, four to six grammes being taken in a glass of water ; according to M. Batka, the guarana contains a vegetable alkali called guaranine.

M. Gavrelle gives the following details on the Paullinia which he has frequently used; he states that it is the product

of the *P. sorbilis*, family *Sapinduceæ*, of which the fruit bears great resemblance in color to the cocoa, its odor is *sui-generis*, its taste bitter, analogous to that of rhatany.

It is prepared by separating the seeds from the capsules, exposing them to the sun, until the integuments will separate by simple pressure; they are then reduced to a fine powder.

M. de Chastetus has found in them, gum, amidon, a brownish red resinous matter, and a crystallizable matter, which possesses the chemical properties of caffein.

In Brazil and the neighboring countries, it is given as a drink mixed with cocoa, for dysentery, and as a tonic. Since it has been brought to France, M. Gavrelle has employed it with success in chlorosis, tedious convalescence, paralysis, the looseness of phthisis, headach, &c., by which it may be seen that its use is similar to that of *guarana*.

Mode of administration.

From numerous experiments carefully made, we are led to the conclusion that the extract made with diluted alcohol, is the preparation which would most exactly represent the properties of the plant.

1. *Lozenges of Paullinia.*

Hydro-alcoholic extract,	21 gram. 3 dec.
Sugar, scented with vanilla,	560 "

Make into lozenges, each containing 6 decigrammes.

2. *Syrup.*

Hydro-alcoholic extract,	10 gram.
Syrup,	1000 "

Fourteen grammes may be given in a day.

3. *Pills.*

Hydro-alcoholic extract, q. s.

To be made into pills containing each a decigramme, with a sufficient quantity of powdered liquorice.

4. *Powders.*

Powder of Paullinia,	4 gram.
Scented sugar,	16 "

Mixed to form one dose.

5. *Tincture.*

Hydro-alcoholic extract,	32 gram.
Alcohol of 22°,	500 "

6. *Ointment.*

Hydro-alcoholic extract,	8 gram.
Lard,	64 "

Journ. de Chim. Med.

ART. XXXVIII.—CHEMICAL EXAMINATION OF THE BARK OF QUILLAIA SAPONARIA. By MM. Henry, Jr., and Boutron Charlard.

MM. L. Eveille, member of the Royal Academy of Medicine, some time ago, sent to us some pieces of bark collected in Chili, and produced by a tree known by the name of *Quillaia saponaria*, which he desired us to examine. It is the result of the experiments upon it which we now present to the Academy.

There is found in the abridgement of the History of Chili by Molina, a detailed description of the tree which furnishes this bark. It is thus expressed: *Quillaja Saponaria, gener. nov. Folia alterna, ovato-oblonga indivisa, denticulata, sempervirentia, petiolata. Pedunculi axillares; flores masculi et feminei in eadem ramo; calyc. foliolis oblongis persistentibus; stam. capillaria, long. calycis; antheræ subrotundæ; germ. subrotundum; styli subulati, capsula subquadrata.*

The trunk of the *Quillaia saponaria* is strait and somewhat elevated; it is covered with a thick bark of an ashen gray; near the summit, it is divided into two or three branches. Its leaves are much like those of the green oak, its flowers are similar, as regards the stamina, but the seeds are enclosed in a capsule with four cells, each containing a seed.*

* The generic description given by Molina, but which has not been appended to this notice by the authors, is inaccurate, hence some little difficulty has arisen with respect to the tree, in the compilation of systematic works. Ruiz and Pavon, the authors of the Flora Peruviana and Prodromus Floræ Peruvianæ et Chilensis, have detailed its characteristics under the name of *Smegmadermos emarginata.* They state that the plant is the same as that referred to in the work of Molina. That the description given by him is erroneous, is admitted by his translator and editor, M. Gruvel, who says, "I am ignorant, from the description given by the author, of what tree he speaks, but I have seen the fruit of the *quillai* of Chili, and which has been given to me under the name of *Cortex saponarius*, brought by M. Dombey. Now this fruit is composed of five capsules, disposed in a star-like form in a common calyx; each capsule is unilocular, and contains several seeds winged at the end, &c." De Candolle, in his Prodromus Plantarum, has admitted the species of Ruiz and Pavon, and has given to it the name of *Quillaia smegmadermos,* at the same time that he has introduced the plant of Molina as of doubtful exsistence under the name of *Q. saponaria?* This botanist had seen specimens but of one species, which alone by the authors of the Flor. Peruv. is asserted to exist. In a collection of plants presented to the Academy of Natural Sciences of Philadelphia by Dr. Styles, formerly a resident of Chili, is contained the species which may be regarded as the true one of De Candolle, as it agrees in all particulars with the account given by this compiler, and with that of Ruiz and Pavon. The following is the description:

Quillaia smegmadermos, Nat. Fam. *Rosaceæ*, Class *Dioica*, Order *Decandria*. De Cand.

Generic characters.—Flowers polygamous by abortion; calyx *five-cleft*, persistent, segments ovate acute, before expansion valvate; corol. petals five, subspathulate, narrow, spreading, hardly longer than the calyx, inserted upon its divisions. Nectary, disk flat, star-shaped, covering the base of the calyx, emarginate and shining; stamens ten; filaments erect, exterior five emarginately inserted upon the nectary, interior five inserted below the disk; anthers in the female flowers sterile, in the male ovate, bilocular, and dehiscent longitudinally. Pistil, germs five, oblong; styles subulate, stigmata capitate; capsules five, oblong,

The wood of the *Quillaia* is hard, reddish, and does not split; the Chilians employ it to make stirups, but the quality which they esteem the most in this tree, resides in its bark, which, when pulverized and macerated in water, produces as much suds as the best soap. This suds is excellent for the removal of stains and grease from linen and cloth, which it completely cleanses. The name originates in the Chilian verb *quilloan*, meaning to wash.

The pieces of bark which have been sent to us are rugose, cracked, fibrous, and of a grayish color exteriorly, whitish interiorly. When broken, there are perceived innumerable small brilliant points. They furnish a grayish powder, having no taste at first, but soon followed by a strong biting impression. It excites considerable cough and sneezing.*

marked at the apex with the remains of the style, spreading in the form of a star, one-celled, superiorly bivalved, valves turned outwards; seeds many, obovate imbricate, at the apices alated. Dec. and R. and P.

J. C.

* The following extracts are from a letter of Dr. Ruschenberger of the United States Navy, to the editor of the American Medical Intelligencer, September 15, 1840.

"I spent the first half of the year 1827 in Chili, and there became acquainted with the quillai bark, and though I was told it was used medicinally by the Indians or aboriginal natives, I never learned any thing in relation to its specific application. As I have stated, it was known more for what might be considered its domestic virtues than medicinal qualities. On my return from Chili in the autumn of 1829, I brought some of the bark to this city; but I do not know that I was the first who did so. I spent some part of the years 1831, 2, and 3 on the coast of Chili, and when I left Valparaiso in October, 1833, the extract of quillai was not known there. I brought home with me a very considerable quantity of the bark, for the purpose of causing experiments to be made with it, to ascertain whether it might not be useful in the arts; and about the same time several tons of the bark were imported into Baltimore. In April, 1835, I received a letter from my friend, Dr. J. Stylés, of Valparaiso, informing me that a foreign pharmaceutist had prepared an extract from the quillai, from which he hoped to derive great benefits, if experiment should prove the extract to be a valuable medicine, as was suspected. As I was on the eve of departure from the United States, I was not able to cause its virtues to be tested, as I had been requested to do.

Analysis.

The powdered bark of *quillaia* was at three different times boiled in water. The solutions were united after filtration, and had a yellow color, a little thick, and slightly viscid. Evaporated to dryness, in a salt water bath, they left a shining extract, of a pretty deep reddish-brown color, scarcely

"When in Chili, in 1827, the fluid extract of quillai was not in general use as a medicine; but chiefly known as a cleanser of woollen and silk stuffs, and a promoter of the growth of hair. Its application was not more extended than the bark itself, which is not used for common laundry purposes in Chili—at least not upon the coast; perhaps for the reason that the tree does not sufficiently abound in the country to render its bark procurable at an expense which would bring it into competition with soap."

"The quillai bark is brought to market in bales, or rather bundles, containing each from one to two hundred or more pounds. The bark is in pieces of from three to five or six feet long, from two to eight inches wide, depending very much upon the size of the trunk from which it may have been stripped. The tree grows sometimes to the height of 40 or 50 feet, having a diameter at the ground of from one to two feet."

"Externally the bark is rough, and of a deep reddish-brown color; its internal surface is smooth, of a cream white, which darkens by age; and when recently dried, is almost entirely covered by minute crystalline particles. When broken, the inner bark is found to be tough, compared with its outer covering, and may be stripped into ribbons and pliant shreds several inches in length. The interstices of its fibres seem to be full of an almost impalpable powder, which is cast out when the bark is fractured, and when brought in contaet with the lining membrane of the nose, excites sneezing, and sometimes a slight sense of stricture about the fauces. Its taste is peculiar; at first slight, then sweetish, warm, and finally leaving an unpleasant impression upon the fauces like that produced by chewing senega, which endures for some time. The old bark floats in water until it becomes thoroughly wet, when it sinks. If steeped in cold water for eight or ten hours, in the proportion of a handful of shredded or coarsely powdered bark to a gallon of water, it produces an infusion of the color of common ley, which, when agitated, presents upon the surface a resemblance to soapsuds.

"From what I have seen of the effects of this cold infusion, I should be disposed to give it a fair trial as an injection in leucorrhœa, with an expectation of very decidedly favorable results, probably more remedial than those which have been derived from a similar application of the monesia in this affection."

sensible odor and a taste extremely pungent, somewhat resembling that of pyrethrum. This extract (A) treated with rectified alcohol, but partially dissolved. The boiling filtered decoction was of a slightly amber color ; by cooling it became cloudy, and deposited a whitish flocculose substance (B) which was collected by a filter.

This matter, which had a hydrated appearance, became considerably reduced by dessiccation. It was then friable, cracked, and closely resembled, as regards physical characters, small fragments of Turic gum. It had no odor ; its taste, at first slightly sugary, soon became very pungent. Re-dissolved in boiling alcohol and decolored by animal charcoal, it was allowed to undergo spontaneous evaporation ; after several days it dried in transparent plates, presenting no signs of crystallization. Moistened with a small quantity of water, it swelled, became opaque, and appeared to become hydrated. By dessiccation it soon assumed its first appearance. Dissolved in water, and placed in contact with a little yeast, a slight fermentative movement took place in the interior of the liquid with the developement of a feeble alcoholic odor.

Treated with nitric acid assisted by heat, this matter dissolved; but after twenty-four hours there was precipitated to the bottom of the capsule, a powder of a canary yellow color, which was separated from the supernatant liquid, and which, when washed, had a well marked bitter taste. The first washings produced in the salts of lime a granulated precipitate. The yellow powder remaining upon the filter, was very soluble, even in cold alcohol at 36°, the solution, evaporated cautiously, left a yellow coloring substance, which appeared to be the result of the action of nitric acid upon the pungent matter.

Some decigrammes of the pungent matter (B) were dissolved in a small quantity of distilled water; they communicated to this liquid an opaline tint, and the property of frothing by agitation. The liquid, tested by several reagents, presented the following phenomena :

The subacetate of lead occasioned in it an abundant curdled precipitate ;

The nitrate of silver, a light degree of cloudiness;
The nitrate of baryta, no change ;
Ammonia augmented the intensity of the color.

The salts of platina indicated the presence of a small proportion of potassa.

The residue of the alcoholic solution from which the pungent substance (B, which has occupied us,) was precipitated, was evaporated by the heat of a salt water bath ; there remained a clear brown extract (C) possessing a great part of the properties of the afore-noticed, but much less pure than it, reddening litmus. When dried it was less friable, which, doubtless, appertained to a fatty substance. We were convinced of this, by treating it with sulphuric ether, which left, after its entire evaporation, a greasy matter mixed with a little chlorophylle.

A portion of this extract was boiled with an excess of caustic magnesia; the precipitate re-dissolved by boiling alcohol, after a slow evaporation, afforded no indication of crystallization. With respect to the acid which was combined with the magnesia, the quantity was so small, that it was impossible to determine what it was.

It has been seen above that the extract obtained from the aqueous decoctions, was treated by rectified boiling alcohol. Which only took up a portion of it; the portion untouched (D) was of a blackish-brown color, dry, friable, cellular, without sensible taste. Cold water allowed to remain in contact with it, became strongly colored without appearing to dissolve it entirely. This liquid, filtered and evaporated, left as a residuum, an insipid substance, colored brown, foaming considerably by agitation in water. Treated with nitric acid, to see if it contained gum, no traces of mucic acid were perceptible.

Calcined in a crucible, it exhaled an aromatic odor, which had some resemblance to that of terebinthinate substances. The ash of calcination was a whitish powder, abundant, effervescing with acids, and which was composed of a considera-

ble proportion of lime, and a small quantity of the phosphate of this base. We think that the carbonate of lime came from the decomposition of a vegetable salt, which we believe to be the submalate, and which in another experiment was deposited spontaneously in the liquid.

Different reagents occasion marked changes in the aqueous solution of this substance. Ammonia produces slight cloudiness, and the color augments in intensity. Lime water forms with it a flocculose precipitate, soluble in the acids ; the nitrate of baryta, a deposit equally soluble in these agents; the oxalate of ammonia indicates the presence of much lime; and the nitrate of silver, traces of the hydrochlorate.

The portion of the extract upon which cold water was without action, was treated with boiling water, the decanted liquid was treated with the tincture of iodine, by which was recognised the presence of amilaceous fecula.

By boiling the bark of the *quillaia*, which had been subjected to boiling water, with hydrochloric acid, there was dissolved a large proportion of the salts of lime, composed of a small amount of the phosphate, and another, which we supposed to be a malate, as above. There was also found an oxide of iron, but not the sulphate. Finally, we did not examine for silica, its presence appeared to us without interest, and the small quantity of bark which we had at our command did not permit us much to vary our experiments.

To resume, the bark of *quillaia* contains :

1. A peculiar matter, exceedingly pungent, soluble in water and alcohol, foaming by agitation with water, drying in thin transparent plates.*

* The peculiar principle here detected is *Saponine*, which exists in other vegetables, as the *Gypsophila struthium*, *Saponaria officinalis*, *Sapindus saponaria*, *laurifolius*, *and rigidus*, the *Leontice leontopetalum*, &c. It has been studied by Bucholz and Bussy. The following account of its properties is taken from a paper of the latter, on the root of the *Gypsophila struthium*, in the xix. vol. of the Journ. de Pharmacie.

Saponine is white, uncrystallizable, endowed with an acrid taste, which is pungent and very persistent ; it is friable. Reduced to fine powder, it

2. A fatty substance united with chlorophylle.
3. Sugar.
4. A brown coloring matter, becoming deeper by alkalies.
5. Gum, (traces.)
6. A free acid.
7. A vegetable salt; the base lime, (malate?)
8. Amidon.
9. Salts, { hydrochlorate of potassa, phosphate of lime.
10. Oxide of iron.
11. Lignin.

is strongly sternutitory. It is soluble in water in every proportion like gum. Its solution is cloudy, but when it has been filtered a number of times, it is transparent; this solution, even when very dilate, froths much by agitation; it is sufficient, if water contains a thousandth of its weight, for this effect to be considerable. In an equal weight it does not form with water a mixture as thick as gum. Evaporated to dryness, this solution leaves saponine under the form of a shining crust, easy to detach and to reduce to powder. Alcohol at all degrees of strength dissolves it, but the power of solution diminishes in the higher degrees. It is dissolved by boiling alcohol at 40°. Weak alcohol dissolves it in all proportions. When obtained from the alcoholic solution, it absorbs the moisture of the atmosphere, and becomes soft and adherent. Ether possesses no action upon it. Exposed to heat, it swells, blackens, does not volatilize, but furnishes an empyreumatic acid oil; in the atmosphere it is inflammable, giving off smoke and an aromatic odor. The acids produce no effect upon the aqueous solution. Hydrochloric acid augments its solubility in alcohol. Nitric acid exerts a peculiar action upon it. The substance is at first dissolved without any reaction except the production of a light yellow color, but by the application of heat, the liquid undergoes a kind of coagulation, like albuminous water. When the reaction energetically takes place with the extrication of suffocating gas, the substance becomes tumid, there is finally formed upon the surface of the liquid a yellow resinous matter, when the action of the nitric acid has terminated. M. Buzzy regards saponine as intermediate between gum and resin. The following is the approximative composition which he gives of it:—

Carbon, - - -	51.0
Hydrogen, - - -	7.4
Oxygen, - - -	41.6
	100.0

J. C.

ART. XXXIX.—ON THE LAURUS CASSIA OF LINNÆUS, AND THE PLANTS PRODUCING THE CASSIA BARK OF COMMERCE. By ROBERT WIGHT, M. D.

MY attention was first directed to this subject by a communication from Government, in which I am requested to endeavor to ascertain "whether the common Cassia Bark of the markets of the world is a thicker and coarser portion of the bark of the genuine cinnamon plant or tree, or whether it is the bark of a plant not analogous to the cinnamon plant or tree."

Before it was possible to return a satisfactory answer to this question, it seemed incumbent on me to ascertain what plant Linnæus meant to designate under the name of *Laurus Cassia,* and whether it was probable the plant so called could supply all the bark passing under that name in the markets of the world. This primary, but most difficult inquiry was rendered indispensable by the, generally supposed, ridiculous assertion of Mr. Marshall, that the leaves, and the bark of the trunk and branches of the *Laurus Cassia* of Linnæus, so far from being aromatic and spicy like cinnamon, are bitter, and have in a slight degree the taste and odor of myrrh. This assertion, wide as it may appear of the truth, is yet founded in fact, and what may appear still more extraordinary, has led to a discovery, which, without such aid as he has given, would not probably have soon been made by a professed botanist, a title to which I believe Mr. Marshall does not aspire. He appears to have been led to the discovery, that the *Laurus Cassia* of Linnæus did not produce aromatic bark, simply through the native name, and wonders how it could have received from him the name of *Cassia,* and had qualities attributed to its bark which it does not in the slightest degree possess. I think I can now answer the question, and explain the mystery which has so long hung over this species, and been hitherto rendered only more obscure by each attempt to bring it to light.

It is well known to modern botanists, that many of their earlier predecessors were but indifferent describers of plants, and often very loose in their quotations of figures as synonyms, a sin of which Linnæus was often about as guilty as any of his contemporaries. He seemed to have had an idea, that their figures were generally at best but approximations to the truth, and that if a figure exhibited even a remote similarity to a plant before him, especially if from the same country, he might with safety quote it as a synonym. Bearing this in mind, we can easily account for a number of errors to which his incorrect synonyms have given rise. The present instance affords an excellent example of what I have here stated, and one which, but for the discovery of Mr. Marshall might have long remained undetected.

In Herman's herbarium of Ceylon plants, he (Linnæus) found one bearing the native names of "Dawalkurundu, Nikadawala," under which it is referred to, or described in Herman's "Musæum Zeylanicum." This he considered a species of *Laurus*, apparently from habit alone, and in his usual brief precise style, calls it, "Laurus foliis lanceolatis trinerviis, nervis supra basin unitis;" having previously called the true cinnamon, "Laurus foliis ovato-oblongis trinerviis basi nervos unientibus." The difference between the two, as indicated by the names, seems very slight, merely depending on the one having lanceolate leaves with the nerves united above the base; while in the other the leaves are said to be ovate-oblong with the nerves distinct to the base—differences small indeed, and such as could never be found of much avail in distinguishing the one plant from the other, since they are both constantly met with in different leaves on the same tree. Such being the case, it is not much to be wondered at that botanists should have been surprised by the boldness of Mr. Marshall's announcement, that two trees, believed to be of the same genus, and so nearly alike in their external forms, should yet differ so very widely in their properties. But so it is, and nothing can be more certain, than that the fact is as he states it.

In proceeding to trace the history of the two species, aided

by the light Mr. Marshall has thrown on them, our difficulties vanish like mist before the noon-day sun, though Mr. Marshall himself has found it "difficult to conceive how the Dawalkurundu obtained the appellation of *Laurus Cassia*, from Linnæus." It was because Linnæus's specimen of Dawalkurundu was neither in flower nor in fruit. Had it been so, he was too acute an observer ever to have confounded it with the plants with which he has associated it in his synonyms. This explanation, it may be answered, is mere assumption on my part—it certainly is so, but supported by so strong circumstantial evidence, as not to leave a doubt of its correctness. Linnæus has in his "Flora Zeylanica" given a short description of each of these species: his description of the cinnamon is principally confined to the flower, and is most precise. In his description of the other, the flower is not once alluded to. Here he declares, that he knows not by what mark to distinguish it from the "*camphorifera Japonensium*," which in its foliage it greatly resembles, but nothing can be more distinct than its inflorescence; that of the camphor tree being a panicle, having a stalk as long as the leaves; while in Dawalkurundu it may be described as a subsessile capitulum, that is, 5 or 6 sessile flowers congested on the apex of a very short peduncle, and surrounded by an involucrum of 4 or 5 leaves; several of which capitula usually form verticels round the naked parts of the branches where the leaves have fallen. He begins his description of *Laurus Cassia** by stating that he at first considered it a variety of the antecedent (cinnamon;) but now, that he knows not by what mark to distinguish it from "*camphorifera Japonensium*," for the leaves are thinner than those of cinnamon, the nerves uniting above the base as in *camphorifera*, and are sprinkled beneath with a grayish dew (*subtus rore cæsio*

* "Hanc speciem olim pro antecedentis varietate habui, nunc vero, qua nota hanc a *camphorifera* Japonensium distinguam, non novi: Folia enim *cinnamomo tenuiora*, nervis ante basin coeuntibus ut in *camphorifera;* subtus rore cæsio illinita, ut Camphora, et simul lanceolata ac tenuiori substantia quam præcedentis."—*Linn. Flor. Zeylanica*, p. 62.

illinita) as in the camphor tree, and are at the same time lanceolate and of a thinner texture than the preceding (cinnamon.) The whole of his description, in short, agrees most exactly with Mr. Marshall's description of the Cingalese Dawalkurundu, and leaves not a doubt that both had the same plant in view, and consequently that Mr. Marshall is so far correct in saying that the bark of the *Laurus Cassia* of Linnæus possessed none of the qualities attributed to it. So far all is clear; but now the chapter of errors begins.

Had Linnæus been permitted to exercise his own unbiassed judgment in this case, it is not improbable he would have avoided the error of assigning to a plant which, with all his acuteness, he knew not how to distinguish from the camphor tree, the credit of producing Cassia, or at all events would not have done so without some expression of doubt, so as still to leave the question an open one. But, upon consulting other authorities, he found in Burman's "Thesaurus Zeylanicus" the figure of a species of *Cinnamomum* or *Laurus* as he called the genus, to which Burman had given the name of *Cinnamomum perpetuo florens*, &c., and assigned the native name of Dawalkurundu, not as it appears from the specimen itself having been so named, but because being different from the true cinnamon of which he had seen specimens and figures, he thought it an inferior, wild or jungle sort, which must of necessity be the plant that Herman had described in his "Musæum Zeylanicum," though the inflorescence differed much from the description, (a very essential point, which Burman remarked and endeavors to explain away,) and therefore gave it the same Cingalese name. Linnæus's specimen not being in flower, and the resemblance between the specimen and figure being in other respects considerable, he had not the means of detecting the discrepancy, and unsuspectingly adopted Burman's figure and name as a synonym to his plant. In Rheede's "Hortus Malabaricus," (1 tab. 57) he found the figure of another cinnamon, even more closely resembling his plant in its general aspect than Burman's figure; this he also associated as a synonym; and Rheede's plant be-

ing lauded on account of the aromatic properties of its bark and leaves, which resemble the true cinnamon, though it is not the genuine cinnamon tree, he seems to have considered himself quite safe in associating this also, and called the three species, this tria juncto in uno plant, *Laurus Cassia*, and assigned it as the source of the officinal "*Cassia Lignea Cortex.*"

After this exposition of the origin of the species *Laurus Cassia*, it can scarcely be a matter of surprise that no two botanists have ever agreed as to the plant which ought to bear the name; nor that not one of them should ever have surmised what plant Linnæus had constituted the type of his species. It is not my intention on the present occasion to extend these remarks, by tracing the various conjectures that have been promulgated on the subject; suffice it to say that no one, so far as I am aware, has taken a similar view as that now explained. It only further remains for me to give some account of the three species thus erroneously associated.

The first mentioned, Dawalkurundu, Linnæus's own plant and the type of the species, is, I believe, the *Laurus Involucrata* of Vahl, and of Lamarck in the "Encyclopédie Méthodique," and has in Professor Nees's Monograph of the Indian *Laurinæ* (Wall. Plant. As. rariores,) received the name of *Tetradenia Zeylanica*, but is the *Litsea Zeylanica* of a former work of his, a name which I presume must be restored, owing to the other being preoccupied. The slight difference of structure does not seem to render a new genus necessary.

The second and third have both been referred, by the same eminent botanist, to his variety of the true cinnamon, the *Cinnamomum Zeylanicum*, a decision to which I cannot subscribe, as I cannot perceive that either of these figures are referable to any form of that species, and they besides differ specifically from each other.

The *Cinnamomum perpetuo florens*, appears to me a perfectly distinct species, very nearly allied to, if not actually identical with, Nees's own species *C. sulphuratum*, of which I have now got specimens from Ceylon. This I infer from

the appearance of the plant as represented in the figure, for if any dependence is to be placed on the description, it is impossible to admit it into the genus. On this however, I do not feel disposed to place much reliance, as it was not the practice a century ago, when the description was written, to examine the structure of flowers with the same care that is now bestowed. Should it be objected, that the species I quote as the *C. perpetuo florens* is clothed with yellowish pubescence, which is not mentioned by Burman, then I have another from the same country (Ceylon) perfectly glabrous, agreeing in the form of its leaves, but differing in having more numerous and smaller flowers, which may be substituted, and that I do not think, more than the other, a variety of the genuine cinnamon tree.

The Malabar plant *Carua* (Hort. Mal. 1. tab. 57,) on the other hand, I consider a very passable figure of a plant, in my herbarium named by Nees himself, *Cinnamomum iners;* but, whether or not I am right in the species to which I have referred it, I can have no hesitation in giving it as my opinion that it is not referable to any form of the *C. Zeylanicum;* neither can I agree with him in thinking the plant figured under the name of *Laurus Cassia* in the "Botanical Magazine," No. 1636, is referable to the Ceylon species, but is I think very like the Malabar one, the only species of the genus to which the name *Cassia* should be applied, if that name is still to be retained in botanical nomenclature, as being the only one of the three associated species known to produce that drug. To another plate of the "Botanical Magazine" (*Laurus Cinnamomum*, No. 2028) I also refer here, and feel greatly at a loss to account for its introduction into that work under a different name from the preceding. The plant which Nees formerly considered the *Laurus Cassia*, but now calls *Cinnamomum aromaticum*, from China, is a very nearly allied species, but is distinct, and furnishes much of the bark sold in the European markets under the name of Cassia, though it has nothing whatever to do with the *Laurus Cassia* of Linnæus, which, from the preceding history, appears strictly confin-

ed to Ceylon and India proper, and that name not being referable to any one species, ought unquestionably to be expunged from botanical nomenclature, its longer continuance there only tending to create confusion and uncertainty. This brings me to the next question—namely, what plant or plants yield the Cassia bark of commerce?

The foregoing explanation, in the course of which two plants are referred to as yielding Cassia, greatly simplifies the answer to this one. The first of these is the Malabar Carua figured by Rheede, the second Nee's *Cinnamomum aromaticum.* The list, however, of Cassia-producing plants is not limited to these two, but I firmly believe extends to nearly every species of the genus. A set of specimens, submitted for my examination, of the trees furnishing Cassia on the Malabar Coast, presented no fewer than four distinct species; including among them the genuine cinnamon plant, the bark of the older branches of which, it would appear, is exported from that coast as Cassia. Three or four more species are natives of Ceylon, exclusive of the cinnamon proper, all of which greatly resemble the cinnamon plant, and in the woods might easily be mistaken for it and peeled; though the produce might be inferior. Thus we have from Western India and Ceylon alone, probably not less than six plants producing Cassia; add to these nearly twice as many more species of *Cinnamomum,* the produce of the more Eastern States of Asia and the Islands of the Eastern Archipelago, all remarkable for their striking family likeness, all I believe endowed with aromatic properties, and probably the greater part, if not the whole, contributing something towards the general result, and we at once see the impossibility of awarding to any one individual species the credit of being the source whence the *Cassia Lignea* of commerce is derived; and equally the impropriety of applying to any one of them the comprehensive specific appellation of Cassia, since all sorts of cinnamon-like plants, yielding bark of a quality unfit to bear the designation of cinnamon in the market, are passed off as Cassia.—*Madras Journal of Literature and Science,* 1839, *No.* 22.

ART. XL.—CORTEX ADSTRINGENS BRASILIENSIS.

From the valuable work of Dr. Dunglison, entitled "New Remedies," we extract the following account of a bark which has the appellation at the head of this article. The name here adopted, however, can only be considered as temporary, as it is exceedingly indefinite, and little comports with the precision of scientific description. The vegetable from which it is derived, being not yet positively determined, the plan of assuming a conventional designation for it, appears to us to have been justifiable, on the ground, that nothing with regard to its origin has been assumed, which, by proving in the course of discovery to be erroneous, would have to undergo correction, and thus lead to subsequent perplexity. This has so often occurred with respect to the source of numerous articles of the vegetable materia medica, that precautionary measures cannot be too much insisted on. If in the course of time the true botanical history of the plant yielding the bark be presented by authority of sufficient respectability, a correct name may be affixed to it, in accordance with settled principles of nomenclature. J. C.

Cortex Adstringens Brasiliensis.

"This bark was introduced into Germany, in the year 1818, by Schimmelbusch, a merchant, who carried it from Brazil, where it had long been used internally as well as externally, as an excellent astringent.* According to Von Martius,† it is the bark of the acacia jurema, but this is not certainly determined.‡ Merrem§ affirms, that the genuine bark is in more or less flat pieces, at times in half, or com-

* Von Schlectendal, in Encyclop. Worterb. der medicin. Wissenschaft. B viii. S. 538. Berlin, 1832.

† Reise, ii. 788.

‡ Riecke, Die neuern Arzneimittel, S. 146.

§ Ueber den Cortex adstringens Brasiliensis. Koln, 1828.

plete rolls, from four to twelve inches long; from an inch to two inches and a half broad, and from one to four lines thick; these are more frequently straight than crooked. The bark may be separated in two parts, an outer, which is rough, and an inner rind of a smooth fibrous character; the two are but loosely connected together. The outer bark is of a grayish brown color, traversed by longitudinal and transverse furrows, having, here and there, white and grayish white crusty growths, covered with a foliated lichen. The inner bark is of a dark red brown on its outer surface, and, after the outer bark has been separated, is somewhat smooth: on the inner side, it is of a brighter reddish brown, and, probably owing to the laceration of the woody splinters, somewhat fibrous. The younger bark is smooth in the fracture, and of a dull splendor. The older bark, which is thicker, is unequal, and may often be separated into fibrous layers, which are readily lacerable. When chewed it has a tolerably strong astringent, somewhat bitter and disagreeable taste, but it does not excite nausea, or leave any *arrière-gout*. It has scarce any smell. In its chemical relations, it resembles the rhatany.*

" *Effects on the Economy.*

" Merrem, who made numerous experiments with this bark, affirms, that whilst it possesses the properties of astringents in general, and to a high degree, it is rather sedative than exciting, agrees with the digestive organs, and aids the peristaltic action. He employed it, first, with more or less success, in hæmorrhage—in epistaxis, hæmoptysis, and menorrhagia; and Günther† found it very efficacious in profuse menstruation arising from atony of the uterus. Secondly; in mucous

* See the analysis by Hofrath Trommsdorff, in Brande's Archiv. B. xxxiii. S. 260; and Dierbach in Heidelberg. Annalen, B. x. H. 3. S. 457. Heidelb. 1834.

† In Harless Rhein-Westphal. Jahrbüchern, B. viii. St. 1, S. 72; and Brande's Archiv. Band xi. S. 200.

discharges, as leucorrhœa, blennorrhœa, &c. Thirdly; in inflammatory and exanthematous affections—as cynanche, urticaria, and in periodical erysipelas of the face. Fourthly; in nervous diseases, especially when combined with disturbance of the menstrual function, and leucorrhœa: and, fifthly; in weakness and catarrhs of the genital organs, bladder, and rectum. The Indians consider, that the bark affects especially the generative apparatus, and from the experiments of Merrem, it would seem, that its agency is more particularly exerted in cases of leucorrhœa; and in many, after the cinchona had been administered without effect.*

" *Mode of Administering.*

"Merrem prescribed it in various forms. He gave the powder in doses of from ℈j. to ʒss. three or four times a day, mixed with water. It appeared to him to act most beneficially in cases of mucous discharges unaccompanied by disorder of the digestive functions; and he found that the powder was better borne by some than the decoction, which is somewhat singular, as the woody matter is more apt, in such cases, to disagree. He rarely gave it combined with aromatics, and never found the combination of use. To form the decoction, an ounce of the coarsely powdered bark was boiled with sixteen ounces of water, down to ℥viij.; and to this an ounce of syrup was added. The dose was from one to two spoonfuls every two hours. Merrem also prepared an extract, and a tincture, in the same manner as these preparations are made of the cinchona; of the former he took from one to two drachms, dissolved it in six ounces of an aromatic water, and added ℥ss. of syrup. Of the mixture, a spoonful was given every hour.

" Externally, the decoction was injected three times a day in leucorrhœa, and in blennorrhœa; or, in the former disease a sponge imbued with the decoction, was introduced, and kept there for some time. It has been applied, also, as an astringent to ulcers.

* Osann, in Encyc. Wörterbuch der medicin. Wissensch. viii. 541.

Mistura Corticis Brasiliensis Adstringentis.

Mixture of the Astringent Bark of Brazil.

℞. Decoct. cort. adstring. Brazil. ℥vij.
Copaib. cum vitelli ovi q. s. subact.
Tinct. ferri pomati aa. ℥ij.
Syrup. balsam. ℥j. M.

Dose.—A spoonful every two hours, in obstinate gonorrhœa and leucorrhœa. MERREM.

℞. Cort. adstring. Brasil. ℥ss.
Coque cum aquæ fontan. q. s.
Sub fin. coction. adde
Herb. sabin. ℥ss.
Colaturæ, ℥viij. adde
Syrup. cort. aurant. ℥j.

Dose.—A spoonful every hour, in cancer of the uterus, and in the hæmorrhage thence arising. MERREM.

ART. XLI.—FORMULÆ FOR THE EMPLOYMENT OF THE LACTATE OF IRON. By P. A. Cap.

The Lactate of Iron, which the researches of MM. Gelis and Conte, and by the report of M. Bouillaud, has been introduced into therapeutics, has commenced to be frequently demanded in the shops. It will therefore be advantageous to fix upon some officinal formulæ, which will permit practitioners to calculate easily the quantity of the salt employed under different pharmaceutic forms. The following are what I propose:

Pastils of Lactate of Iron.

℞. Lactate of iron, 30 grammes.
Sugar, 360 "
Mucilage of gum arab. q. s.

Mould into lozenges, weighing 65 centigrammes, each of which will contain 5 centigrammes of the salt.

Syrup of Lactate of Iron.

℞. Lactate of Iron, 4 grammes.
Boiling distilled water, 200 "
White sugar, 400 "

The lactate of iron not being soluble but in 40 parts of boiling distilled water, a greater quantity can hardly be introduced into a syrup. This proportion is a 150th, (about 4 grains per ounce.) The method which has best succeeded with me is the following:

Triturate the salt with four times its weight of pulverized sugar, dissolve it rapidly in the whole of the distilled water, and pour the whole into a matras, which is to be placed in a salt bath, after having added the remainder of the sugar, broken into small fragments; as soon as the sugar is dissolved, pour the syrup on a filter; and when it has cooled, preserve it in well stopped bottles. This syrup has a light amber tint

and keeps exceedingly well. I believe that its employment is more convenient than that of the pastils, because its ferruginous taste does not remain so long a time in the mouth.

Pills of Lactate of Iron.

℞. Lactate of Iron.
Powdered marshmallows, 1 gramme.
Honey, q. s.

Make 20 pills, which should be silvered immediately, or covered with gelatine according to the method of M. Garot.

I give this formula, which can be modified in the doses, only to inform practitioners that it would be improper to bring in contact with the lactate of iron, astringent extracts, or others capable of decomposing it.

Journ. de Pharmacie.

ART. XLII.—NOTE UPON DIFFERENT FALSIFICATIONS OF THE LACTATE OF IRON. By M. Louradour.

In the March number of the Journal de Pharmacie,* I have described the method adopted by me for the preparation of crystallized lactate of iron. Since that period, having had occasion to examine different specimens of lactate of iron, I have detected several adulterations practised by aid of the pulverulent form, under which manufacturers have believed they ought to introduce it into the market, and I hasten to make them known to my associates.

I have found, in fact, in some of these specimens, effloresced sulphate of iron, or the same precipitated with alcohol; in others, starch or sugar of milk.

Nothing is easier than to determine the first of these adul-

* See last number of this Journal.

terations by means of nitrate of baryta, which precipitates all the sulphuric acid from the sulphate. For the second, the tincture of iodine affords a sensible reagent.

The third is less easy of detection, the sugar of milk and lactate of iron being equally soluble in water, and insoluble in alcohol or ether. We can succeed, however, by means of nitric acid, which transforms the sugar of milk into mucic acid. Heat about 2 grammes of the suspected article with 30 grammes of nitric acid, until the whole shall be reduced to 6 or 7 grammes. If the salt be pure, the liquid will remain clear after cooling. Should the salt contain lactine, it will form a white pulverulent precipitate of mucic acid, of which the characters can be easily recognised.

It is possible, doubtless, to avoid these falsifications, by testing the pulverized lactate of iron before employing it, but it is simpler and surer not to admit the salt, except under the form of crystalline plates, which with difficulty permit of fraud.

Journal de Pharmacie.

ART. XLIII.—UPON THE FORMATION OF LACTIC ACID, EXTRACTED FROM A NOTE COMMUNICATED TO THE SOCIÉTÉ PHILOMATIQUE. By MM. FREMY, AND BOUTRON CHARLARD.

THESE two chemists have been enabled to determine with precision the circumstances and the agent which form lactic acid. All animal matters which act as ordinary ferments, may at length undergo a modification, which causes them to assume a new and more energetic power. They acquire in fact the property of transforming into lactic acid, not only sugar, but in addition dextrine, gum, amidon, &c.; at the same time their action is paralyzed at a temperature of 100°. MM. Fremy and Boutron, hope that the investigation of these phenomena, will permit them to explain the formation of acids in vegetation; it has led them to discover the following method of preparing lactic acid.

Independently of diastase, malt contains a sufficient quantity of animal matter to produce the formation of lactic acid, when it becomes modified.

To obtain this result, malt slightly moistened is enclosed in stopped flasks and kept in them for three or four days. During this interval, the animal matter contained in the barley, becomes modified, the temperature is elevated; and if barley, thus modified, is kept in water at 40°, this water becomes strongly acid, and is charged with considerable quantities of lactic acid. It appears evident to MM. Fremy, and Boutron, that in this case the diastase transforms the amidon into dextrine and sugar, which is changed into lactic acid under the influence of the animal matter.

Journ. de Pharmacie.

ART. XLIV.—NOTE UPON TANNIN.

By M. Beral.

Liquid tannin, that is to say, that which is obtained directly from nut galls by hydrated sulphuric ether, is different from solid tannin. The latter is a pure immediate principle, the other is composed of tannin, water, and sulphuric ether, in proportions not correctly determined, but which I believe to be constant; or at most, susceptible of slight variations. The following facts permit us, at least in my opinion, to adopt the following conclusions.

1st. Liquid tannin is very little soluble in water saturated with sulphuric ether, yet when tannin is added to hydrate of ether it is soluble to a marked degree.

2. When the watery solution of nut galls is saturated with sulphuric ether, the tannin contained in it is transformed into liquid tannin, and this is separated from the remainder of the liquid.

3. Tannin dissolved in water is affected in the same way, when ether is mixed with it. By standing, the mixture is separated into three strata, the first, or that at the bottom, is liquid tannin, the second is etherealized water, and the third is ether. This experiment succeeds best when the solution is concentrated.

The property recognised in tannin of being little soluble in hydrate of ether is interesting, as it led me to suspect the possibility of extracting from the diluted tincture of nut galls, a part of the tannin which it contains, an extraction which, up to this time, had been considered as impossible. In fact, in the memoir upon tannin published by M. Pelouze in the Annals de Chimie et de Physique, we read the following: "Tannin is one of the most easily altered substances known, and it is besides accompanied in vegetables with coloring matters, of which it is extremely difficult, perhaps impossible, to free it completely, when the solution is at the same time effected."

Aqueous solution of nut galls and extraction of the tannin which it contains.

℞. Nut galls in fine powder, 4 oz.
Distilled water, 8 "

Mix. After two hours, pour the mixture upon a paper filter placed in a funnel. Place under it a vessel to receive the liquid which filters through, and when it has ceased to run, add two ounces of sulphuric ether to the solution obtained, the quantity of which will be about four ounces. Shake the mixture for a few minutes; pour it into a funnel with a stop cock. After standing a few moments, the liquid tannin which forms, will occupy the lower portion of the vessel. Separate it, and repeat the operation until no more liquid tannin is formed. Dry what has been obtained by the heat of a stove, carried to 100° C.

By this method the whole of the tannin contained in the solution of nut galls cannot be obtained. About two-thirds remain in solution, a fact which depends upon some circumstance to be determined.

Theory of the extraction of Tannin by ether.

M. Pelouze, in the memoir cited, thus expresses himself upon the subject of the extraction of tannin.

"Of all the substances which constitute nut galls, that which is most soluble in water, and which has the greatest affinity for this liquid, is tannin.

"When, therefore, nut galls in fine powder are brought in contact with ether containing water, the tannin seizes upon the water contained in the ether, forms with it and a certain quantity of ether a very dense syrup, which by degrees is pushed from the filter into the decanter by the upper layers of ether, which in this case perform the office of a piston. A remarkable fact, which equally explains itself; the liquids are scarcely colored, while if the residue of the nut galls be treated with distilled water, there is extracted a reddish-brown

liquid, which contains in solution the coloring matters of these same nut galls."

This theory is based essentially, as is seen, upon the presumption that the tannin is much more soluble in water, than the coloring matter of the nut galls, and subsidiary upon these two facts, viz.: that the tannin is the predominant principle of nut galls, and that it is always in excess with reference to the quantity of water with which it is brought in contact.

I am persuaded that this is not the case, and that the separation of the tannin from the other principles which is so exact and so complete, is solely due to the property possessed by this substance of combining with determined quantities of water and ether. In fact, by refusing to admit this new theory, we will be reduced to the necessity of saying, that we cannot separate the tannin from the aqueous solution of nut galls, but when this body is less soluble in water than the coloring matter. The elimination of the tannin is certainly not due any longer to the preponderance of this same tannin, for we know that the hydrated ether abstracts from nut galls the least proportion of tannin that it contains, and at this point of the operation it is very evident that the coloring matter predominates.

Liquid tannin is approximatively formed of

Tannin,	40
Water,	7
Sulphuric ether,	53
Total,	100 parts.

Shaken with a mixture of ether and water, the tannin produces a liquid, the composition of which is analogous to the above, although the tannin should be in contact with an excess of ether and water.

The ingenious method of M. Pelouze to obtain tannin is certainly the best, relatively to the purity of the product, but it leaves much to be desired in am nyrespects.

It is certain, that in hands skilled in this work, the execution of the process which occupies us is easy, but it isnot less true, that in other hands it is always variable, and the quantity of tannin obtained is different according to the nature of the ether employed.

The method of M. Le Connet furnishes more tannin with less expense; but the execution is little convenient and the product less pure.

I have searched, but uselessly, for a method, by the aid of which it was possible to extract from nut galls, with facility and certainty in the results, 46 or 50 per cent. of tannin, sufficiently pure for the uses of medicine.

I have submitted nut galls to many modes of treatment, yet I shall content myself with stating but one of them.

Extraction of Tannin by hydro-alcoholic sulphuric ether.

℞.	Rectified sulphuric ether,	12	oz.
	Alcohol at 30° Cartier,	3	"
	Distilled water,	1	"
	Total,	16	oz.
	Nut galls in fine powder,	8	"

Suspend the powder in half of the ethereal liquid, place the mixture in a funnel with a stopcock, pour upon it the remainder of the solvent, and after six hours contact open the cock and collect the fluid which runs off, taking care at the same time to add 4 or 5 ounces of water, in order to displace the ether retained by the powder. You obtain a yellow solution, about 12 or 13 ounces in weight, and which will furnish by proper evaporation near 4 ounces of tannin. Thus obtained, the tannin has a pale yellow color, due to a small quantity of coloring matter; it can become of use in the arts.

Journ. de Chim. Med.

ART. XLV.—SULPHURIC ACID CONTAINING ARSENIC.

In the Repertory of Pharmacy of Buchner, M. Wackroder,* has drawn the attention of chemists to an acid called English sulphuric acid, but which is probably from Bohemia, and is actually to be extensively found in commerce. This acid contains, besides sulphate of lead, considerable arsenic acid. It is likewise announced that this article cannot be used as the means of obtaining pure hydrochloric or rectified sulphuric acid; and in consequence of the alteration produced in these acids by the arsenic contained in it, it should be rejected in their preparation. It has since been noticed, that it will not answer in the preparation of pure nitric acid, and sulphate of zinc, in the disengagement of hydrogen gas, or in general for any chemico-pharmaceutical agent.

New trials have confirmed him in the truth of these opinions; they have demonstrated to him the frequent alterations produced in phosphorus by the presence of arsenic. The facts communicated by MM. Barweld and Wittstork, (*Jarbuche für die Pharmacie*,) came under his notice during his researches. According to the experiments of this chemist, he used, together with M. Muller, a sulphuric acid containing arsenic, and was not able to obtain from bones phosphoric acid exempt from arsenic, even when this phosphoric acid was purified by means of alcohol. On saturating this acid by carbonate of soda, all the arsenic passed to the soda and remained in combination with it, principally in the last crystals obtained from the solution. Phosphates free from arsenic cannot be formed with such an acid, except it be previously purified by sulphuretted hydrogen. An examination of the phosphate of soda of commerce, appears to us very necessary, as in many shops a phosphate has been found which was rendered impure by the presence of arsenic. Likewise the chemists of Berlin have found arsenic in phosphorus. Phosphoric acid prepared from phosphorus, by nitric acid, will always contain

*Journ. für Pract. Chemie.

arsenic, although a portion may be reduced during evaporation, by the agency of the phosphorous and nitrous acids, but principally by the phosphuretted hydrogen which is developed. It results from this that a perfect purification of this acid cannot take place without the agency of sulphuretted hydrogen. I may add, that I have never detected arsenic in the water in which phosphorus has been kept.

But, if sulphuric acid containing arsenic is pernicious in pharmaceutical preparations, it should also be in the extraction of tartaric acid. In fact we have found arsenic in the liquor from which tartaric acid has been separated by crystallization. Nevertheless, we have never detected arsenic in the tartaric acid of commerce, which is generally in large and handsome crystals, although it may have contained lead. All these facts prove that too much attention cannot be paid to the chemico-pharmaceutical products as they exist in commerce.

In a report made to the Royal Academy of Medicine, we have made known the fact that the sulphuric acid prepared at Lyons from pyrites contains arsenic.

Journ. de Chim. Med.

ART. XLVI.—NEW TEST LIQUOR FOR ACIDS AND ALKALIES. By J. MARSH.

THE infusion of the common red cabbage has been long in use in the chemical laboratory, as a test to distinguish acid from alkaline bodies when in solution; and although possessed of great delicacy in this respect, is still subject to an objection, on account of its becoming so exceedingly offensive in its smell, after having been prepared a few months.

In order to obviate this objection, I undertook some experiments, about two years ago, on the coloring matter of the dark red hollyhock, the purple radish, and the dark red beet root; but during my experiments, I found many objections to all. The beautiful blue color of the dark red hollyhock, obtained by alcohol, is, however, worthy of notice; but I have not had time to look much to it during my experiments on this subject, my attention being forcibly drawn to the beautifully colored infusion obtained from the dark varieties of the dahlia, such as the Conqueror of Sussex, Sir Edward Codrington, Sir E. Sugden, Alman's Splendissima, Parson's Rival, Brown's Ion, Holme's Rival, Sussex Lima, Metropolitan Perfection, Pasha of Egypt, Robert le Diable, and Sambo,—these being the varieties that I have mostly employed; there are many more equally good, but they have not fallen in my way.

This infusion is easily obtained as follows:—Into an infusion pot, or any common earthen vessel, let as many of the petals of the above named dahlias be lightly pressed, and then boiling hot distilled, or good rain water, sufficient to cover the petals about an inch, be introduced. The best method of keeping them down, is by means of a piece of plate glass or the foot of a broken tumbler, or even a piece of common porcelain will do very well. The whole may be kept on the hob of a common fire place, simmering for two or three hours, covered over with a piece of common paper, to keep out any dirt which might otherwise fall in. The liquor is then to be

poured off the petals, which will be found almost colorless. To every pint of the solution add half an ounce of sulphuric acid, keeping the whole slowly stirred with a slip of glass. When quite cold, add to every pint of the mixture two grains of corrosive sublimate, dissolved in a portion of the liquor: filter the whole through a piece of coarse cloth, and bottle it up; and it will be immediately fit for use.

When wanted for use, the liquor is to be carefully neutralized by ammonia, which gives it a dim olive color, and in this state it may be used liquid; or bibulous paper may be dipped in it, and then dried. Either the liquor or paper will become green with alkalies and red with acids.

Being desirous of turning to account some of the qualities of this class of flowers now so much cultivated and so generally admired, and also of rendering them useful as well as ornamental, I have made several attempts to fix it as a dye stuff on cloths, &c., but have not yet succeeded in my attempts to my own satisfaction.

The great abundance of these flowers, and the ease with which they can be obtained, (as they answer every purpose after having been exhibited) together with the simple method of obtaining this test liquor, will, I hope, be thought worthy of the attention of the Society of Arts. In conclusion, I beg to add, it has been approved of and adopted at the Royal Military Academy and Royal Institution; and any further information that the Society may require in regard to this subject, I shall feel much real pleasure in communicating when the the Society may honor me with their commands.

Trans. Soc. Arts, Manuf. and Com.

ART. XLVII.—FREE HYPOSULPHUROUS ACID. By M. LANGLOIS, Professor of Chemistry in the Military Hospital of Instruction, of Strasbourg.

M. HERSCHEL and M. Gay Lussac have in vain attempted to isolate hyposulphuric acid from hyposulphate of strontian; the former employing sulphuric acid, the latter an alcoholic solution of hydrochloric acids. M. Langlois has succeeded in decomposing the hyposulphite of potassa, by means of perchloric acid, added by degrees to a cold solution of this salt. He separated by the filter the perchlorate of potassa, and concentrating the liquid in vacuo, obtained the hyposulphurous acid, as a colorless liquid, of a syrupy consistence, and of a strongly acid and bitter taste. At the temperature of 80°c. this acid is decomposed, producing sulphurous acid gas and a deposit of sulphur. It does not affect the salts of lime, strontian, iron, zinc, and copper, but it precipitates the salts of lead, silver, mercury, and platinum. Nitric and chloric acids immediately decompose it.

Comptes rendes a l'Institut, and Journ de Pharm.

ART. XLVIII.—EXAMINATION OF FALSE AND TRUE ANGUSTURA BARK. By M. GENEST, JR., of Angers.

NOT finding in authors who have written upon this subject, well defined discriminating chemical characters of the two kinds of angustura, I have repeated the experiments, which I have found detailed in books, and at the same time I have undertaken a series of new researches, with the view of fixing upon some prominent points of difference. Although I may not flatter myself that I have attained the end in view, yet all that relates to the discrimination between these two barks is of so much interest to pharmaceutists, that I think I ought to report the results, which are different from those previously stated, and which I suppose peculiar to myself, as well as the new reactions exhibited by the experiments made with the above intention.

A drachm of the powder of each kind, was allowed to macerate in an ounce and a half of distilled water; the supernatent liquid when filtered presented the following phenomena:

	True.	*False.*
Chloride of Barium,	No precipitate.	Much cloudiness; then a precipitate, which did not entirely dissolve in nitric acid.
Bichloride of Mercury,	The reaction resembles that indicated in the books.	Abundant dull white precipitate.
Tartar Emetic,	Same observation.	In place of a white precipitate, I obtained but a slight cloudiness.
Perchloride of Iron, This reagent appeared to me to present a greater difference than the sulphate of the same base.	A very abundant reddish brown precipitate.	Dull green.
Sulphuric Acid,	It did not render the true very cloudy, as it is said it ought to do. I obtained but a slight cloudiness.	

Decoction.

I boiled for ten minutes the same quantity of both kinds in the same amount of water. I remarked that the powder of the true became more voluminous than that of the false. Its decoction was filtered with greater difficulty.

When preserved for several days, the preparation of the true, preserved its color and transparency, whilst the other stained the sides of the glass and assumed a blackish-brown color.

	True.	*False.*
Chloride of Barium,	Nothing.	Cloudy.
Nitrate of Silver,	Abundant yellow precipitate.	Nothing.
Sulphuric Acid,	Yellow precipitate.	Nothing.
Perchloride of Iron,	Gray precipitate.	Deep green coloration, without precipitate.
Caustic Potassa,	Reddish yellow coloration by refraction, and dull green by reflection.	Greenish tint, the liquid remaining transparent.
Phosphate of Soda,	Nothing.	Nothing immediately—then deep brown coloration.

Journ. de Chimie Medicale.

ART. XLIX.—ON CERTAIN FACTS RELATIVE TO THE OXIDES OF SULPHUR By M. PERSOZ.

In a thesis, sustained seven years since before the Faculty of the Sciences of Paris, M. Persoz said that certain compounds, and especially sulphuric acid, were comparable to cyanogen, and might like it exercise the functions of simple bodies in uniting with oxygen, sulphur, chlorine, bromine or iodine; under this view, sulphuric acid cannot be considered as a compound of sulphur and oxygen, but rather as composed of two volumes of sulphurous acid, and one of oxygen, and he was naturally induced to place the sulphurous acid, as a new radical, in contact, successively with different simple bodies, with which it might unite to produce compounds analogous to the binary combinations of simple bodies. M. Persoz had applied himself to the study of these combinations when the publication of M. Langlois on hyposulphurous acid constrained him prematurely to make known the results which he had obtained.

M. Vauquelin, by acting with 8 grammes of sulphur, upon 10 grammes of carbonate of potassa, and ascertaining the sulphur in each product, which he procured, could find only 7.183 grammes. This singular observation having caused M. Persoz to suspect that Vauquelin had been led into error by the formation of an unknown compound, he repeated the experiments, by fusing at a red heat, 80 gr. of sulphur with 100 gr. of carbonate of potassa, dry and pure. The matter, when cold, pulverized and subjected to alcohol of 40° left a pulverulent residuum, analogous in appearance to sulphate of potassa. He examined the residuum, and found that when heated in a small tube, it gave off sulphur, and that treated with nitric acid, at a moderate temperature, it decomposed this acid and deposited sulphur; he recognised at last that this salt was formed by hyposulphurous acid, and according to his system he denominated it sulpho-sulphuric

acid, $\ddot{S}+S$, and of which many of the properties confound it with its analogous oxy-sulphuric acid, $\ddot{S}+O$.

M. Persoz succeeded in isolating the sulpho-sulphuric acid, by decomposing the sulpho-sulphate of lead by sulphuretted hydrogen. He filtered the liquor, and evaporated in vacuo, or on a stove in flat bottomed capsules, and thus obtained an acid, colorless, very dense, and decomposable by heat into sulphurous acid and sulphur. The sulpho-sulphuric acid decomposes in the cold the carbonates of soda, potassa, lime, magnesia and lead, it unites directly with bases, and form salts, which are to the oxy-sulphates as the seleniates are to the sulphates, or arseniates are to the phosphates.

In contact with simple bodies, or compounds which have a direct action on sulphur or on sulphurous acid, the sulpho-sulphuric acid is always destroyed. Either in the cold or with the aid of an elevated temperature, it decomposes the salts formed with acids or bases of easy reduction. We can easily designate its properties and those of the sulpho-sulphates, and forsee the phenomena to which it should give rise, by considering its analogy with the oxy-sulphuric acid and the properties of its elements, sulphurous acid and sulphur.

Journ de Pharm.

ART. L.—ON SALSEPARINE.

By M. Beral.

Many pharmaceutists, among whom it is proper to cite Thubeuf, have been engaged upon salseparine. After having pointed out different methods by which this substance can be obtained, they have informed us of its chemical properties and elementary analysis.

Having devoted myself to researches with the view of determining the best method in practice for the preparation of the essence of sarsaparilla, I became assured (several years ago) that sarsaparilla, when treated with cold water, furnished a more sapid medicine, than that which results from the prolonged action of boiling water, upon the same substance. It was in consideration of this fact, that I proposed to substitute maceration for decoction, the practice of which had become almost universal. At that period I was convinced that the application of this mode of treatment for the extraction of the medicinal principles of sarsaparilla would secure great advantages for therapeutics. A great number of medical observations have since fully justified my anticipations upon this subject. It is known that many physicians have obtained effects, by the use of sarsaparilla, which have been called in question by numerous other practitioners. Such opposing experience without doubt depends upon the fact, that the first had made use of preparations of sarsaparilla prepared without heat, or at a moderate temperature, and that the others had employed such as were made by an opposite plan. In pursuing my researches upon sarsaparilla, I have ascertained that this substance contains a volatile principle, and I have been sufficiently fortunate as to be able to isolate it. Having been examined with care, this principle has been found to be pure salseparine.

This fact, which has escaped the researches of our predecessors, and which I believe to be of some importance in medicine, explains every thing, and proves, in a satisfactory manner,

that heat employed for the extraction of the active parts of sarsaparilla should be banished from practice. Salseparine, possessing great medical power, every thing concurs to lead us to presume that to its presence sarsaparilla owes the properties which have given to it so exalted a reputation in the healing art.

It can be imagined, that in consequence of the volatility of salseparine the preparations of sarsaparilla which have been submitted to the action of heat are entirely deprived of this principle. I am certain, on the contrary, that the extract obtained by the concentration of the alcoholic tincture, by aid of the salt water bath, still contains a considerable quantity of it.

I have obtained salseparine, by distilling in a salt water bath a tincture of sarsaparilla, prepared with very dilute alcohol, and filtering the product after it has stood several hours.

Journ. de Chimie Medicale.

ART. LI.—ON THE PREPARATION OF SANTONINE.

By M. A. Guillemette.

Having latterly had occasion to prepare santonine for use in pharmacy, I had recourse to the processes of MM. Koehler and Merck. The former treats the semen-contra by sulphuric ether, and distils off the ether to obtain crystals; these are purified by solution in alcohol to which a little hydrochloric acid has been added. The latter consists in submitting the seed to the action of slacked lime and alcohol, and distilling the tincture to one-fourth, filtering to separate the resin, then treating with heat the alcoholic extract by concentrated acetic acid, which upon cooling deposits the santonine in crystals. After frequent solution in alcohol mixed with charcoal, and crystallization, it is obtained in a pure state.

These processes succeed sufficiently well in extracting nearly all the santonine from the semen-contra; but they appear to me to be too expensive.

Many German physicians having recognized in this substance well marked vermifuge properties, in the dose of thirty or forty centigrammes, I have thought that it would not be without interest to make known a process by which it might be obtained more readily and at less cost, and put it in the power of physicians to judge of its medicinal properties. In detailing these observations upon that species of stearoptene, I am desirous of seeing it some day enriching the portion of the materia medica used in infantile cases, as its nature permits it to be administered with facility.

The chemical properties of this substance are very remarkable, and have been well investigated by the chemists to whom we are indebted for our knowledge of its existence. It presents itself as brilliant crystals, under the form of elongated quadrilateral tables; it is insoluble in water, but soluble in alcohol and ether; its solutions have a bitter taste. It is neither alkaline or acid, nevertheless, it combines strongly with bases, and forms with lime, baryta, and oxide of lead, crystallizable

salts. When a mixture of santonine, lime, water and alcohol, is heated it becomes red; and upon cooling, deposits crystals in the form of red silky needles, which spontaneously become white, by decrease of temperature losing their color. I availed myself of the facility with which I have succeeded in obtaining this substance, to re-investigate its properties. If my experiments should afford any result, I shall have the honor of submitting them to the Society of Pharmacy.

The following is the process which has afforded me the best results: 2000 grammes of semen-contra of Aleppo were reduced to a fine powder and moistened with sufficient cold water to form it into a soft paste, and after macerating for six hours was subjected to pressure. The cake being pulverized, was again macerated, and expressed eighteen hours after. The mass having been dried and pulverized, was placed in contact with alcohol of 89° c. and then, after a maceration of twenty-four hours, expressed. This process was repeated until the mass was exhausted.

The alcoholic solutions were united and filtered, then distilled on a salt water bath, to about 350 grammes. This tincture, set aside in a capsule, soon deposited in crystals all the santonine which it contained. Part adheres to the vessel, the rest remains mixed with resin, volatile oil, and chlorophylle. It is separated from these by decantation, and pressing the crystals between folds of muslin. They are then purified by boiling alcohol and charcoal. Two crystallizations were sufficient to obtain it pure, and similiar to the specimen which I now have the honor to submit.

A kilogramme of seed yields me nearly four gros of santonine. *Journ. de Pharm.*

ART. LII.—MODE OF DETECTING THE ADULTERATION OF ESSENTIAL OIL WITH ALCOHOL, BY MEANS OF CHLORIDE OF CALCIUM. By M. BORSARELLI.

THE author provides himself with a small cylindrical tube about three centimetres in diameter, and twelve in length, closed at one extremity. He fills this two-thirds full of the essential oil, and introduces small pieces of chloride of calcium, perfectly dry, and totally free from dust ; the opening of the tube is then closed, and heat applied for four or five minutes, by means of a salt water bath, of the temperature of 100°, taking care to shake the mixture occasionally, and then allowing it to cool slowly.

If the essential oil contains a notable proportion of alcohol, the chloride dissolves entirely, and forms a stratum of liquid which occupies the inferior portion of the tube, while the essential oil rises above. When the essential oil contains but a very small proportion of alcohol, the pieces of chloride of calcium, lose their form and reunite at the bottom into a white adherent mass. Finally, when the oil is perfectly pure, the fragments of chloride do not undergo any change even in shape.

It is proper to add, that when we wish to test any essential oil, we should employ the chloride of calcium, in very feeble quantities at first, and afterwards to add gradually the new fractions, lest if the proportion of alcohol be very small, it should not be absorbed by the chloride without sensibly changing it, or without its presence being recognised. In every case it is easy to determine the proportions of a mixture of alcohol and essential oil, by comparing its volume or weight with the volume or weight of the essential oil which floats upon the surface of the alcoholic solution of the chloride, when the operation is finished.

The author adds, that the same process may be employed to detect the quantity of alcohol which ether may contain, by using a longer tube and taking care not to close it very exactly.

Rev. Scien. et Indust. and Journ. de Pharm.

ART. LIII.—THE ACTIVE PRINCIPLE OF THE BARK OF THE ROOT OF THE ELDER (SAMBUCUS NIGER.) By E. SIMON, Pharmaceutist at Berlin.

M. SIMON concludes from his researches upon this substance, that its active principle is a soft resin, and that it does not contain a crystallizable matter. The bark of the root dried at 20° R. was reduced to powder and treated by several portions of alcohol of 0.825 until it ceased to dissolve anything; these tinctures were filtered and distilled on a salt water bath; to withdraw the alcohol the resulting syrupy mass was mixed with ether, which separated a hard resin, of but little activity, and the liquid was evaporated to a thick extract. Twenty grains of this extact were sufficient to produce four or five vomitings, and as many stools.

Ann. der Pharm. and Journ. de Pharm.

ART. LIV.—ON THE CULTIVATION OF ROSES AND THE MANUFACTURE OF ROSE WATER AND UTUR AT GHAZEEPORE.

WE are indebted to Dr. Jackson, Civil Surgeon at Ghazeepore, for the subjoined very interesting note on the celebrated Rose trade of that district. The information was sought for, for a work now in progress on "Indian Materia Medica;" meanwhile we have much pleasure in giving publicity in this Journal to the curious facts Dr. Jackson has collected.

Journal of the Asiatic Society of Bengal, of May, 1839

I have now the pleasure of sending you the information you require on the manufacture and trade of Rose-water in this district. Ghazeepore seems to have been long famed

for its Attar and Rose-water, and having got the name, it has done its best to preserve it. The cultivation of the Rose plant is sufficient to supply the demand, and as the average remuneration is not more than enough to compensate for the trouble of its culture, no competition from the adjoining districts has been made.

Around the station of Ghazeepore there are about 300 beegahs, or about 150 acres, of ground laid out in small detached fields as Rose gardens, most carefully protected on all sides by high mud walls and prickly pear fences, to keep out the cattle. These lands, which belong to Zemindars, are planted with Rose trees, and are annually let out at so much per beegah for the ground, and so much additional for the Rose plants—generally five rupees per beegah, and twenty-five rupees for the Rose trees, of which there are 1000 in each beegah. The additional expense for cultivation would be about 8|8; so that for rupees 30|8 you have for the season one beegah of 1000 Rose trees.

If the season is good, this beegah of 1000 Rose trees should yield one lac of Roses. Purchases for Roses are always made at so much per lac. The price of course varies according to the year, and will average from 40 to 70 rupees. During the past season the latter was the price given for one lac of Roses towards the conclusion.

As soon as the Roses come into flower, the Zemindars and cultivators of the Rose gardens, as well as intending purchasers, meet in the city, and according to the demand and expected produce, a *nerick* is established, and purchasers then enter into agreement with the cultivators for so many lacs of Roses at such a price. This agreement is considered binding, and the cultivator is obliged to deliver the quantity at the contract rate; when that is completed another can be made, but this latter is always at a much higher rate.

The Rose trees come into flower at the beginning of March and continue so through April. In the morning early the flowers are plucked by numbers of men, women, and children, and are conveyed in large bags to the several contracting

parties for distillation. The cultivators themselves very rarely manufacture.

The native apparatus for distilling the Rose-water is of the simplest construction; it consists of a large copper or iron boiler well tinned, capable of holding from eight to twelve gallons, (shaped like the earthen hoondahs in which the Gomastahs send in their Opium) having a large body with a rather narrow neck, and a mouth about eight inches in diameter; on the top of this is fixed the head of the still, which is nothing more than an old *dekchee*, or cooking vessel, with a hole in the centre to receive the tube or worm.

This tube is composed of two pieces of bamboo, fastened at an acute angle, and it is covered the whole length with a strong binding of corded string, over which is a luting of earth to prevent the vapor from escaping. The small end, about two feet long, is fixed into the hole in the centre of the head, where it is well luted with flour and water. The lower arm or end of the tube is carried down into a long necked vessel or receiver, called a *bhubka*. This is placed in a handee of water, which as it gets hot is changed. The head of the still is luted on to the body, and the long arm of the tube in the *bhubka* is also well provided with a cushion of cloth, so as to keep in all vapor. The boiler is let into an earthen furnace, and the whole is ready for operation.

There is such a variety of Rose-water manufactured in the bazar, and so much that bears the name, which is nothing more than a mixture of sandal oil, that it is impossible to lay down the plan which is adopted. The best Rose-water however in the bazar may be computed as bearing the proportion of one thousand Roses to a seer of water; this perhaps may be considered as the best procurable. From one thousand Roses most generally a seer and a half of Rose-water is distilled, and perhaps from this even the Attar has been removed.

The boiler of the still will hold from eight to twelve or sixteen thousand Roses. On eight thousand Roses from ten to eleven seers of water will be placed, and eight seers of Rose-water will be distilled. This after distillation is placed

in a carboy of glass, and is exposed to the sun for several days to become *puckah;* it is then stopped with cotton, and has a covering of moist clay put over it; this becoming hard effectually prevents the scent from escaping. The price of this will be from twelve to sixteen rupees. This is the best that can be procured.

To procure the Attar, the Roses are put into the still, and the water passes over gradually as in the Rose-water process; after the whole has come over, the Rose-water is placed in a large metal basin, which is covered with wetted muslin tied over to prevent insects or dust getting into it; this vessel is let into the ground about two feet, which has been previously wetted with water, and it is allowed to remain quiet during the whole night. The Attar is always made at the beginning of the season when the nights are cool; in the morning early the little film of Attar, which is formed upon the surface of the Rose-water during the night, is removed by means of a feather, and it is then carefully placed in a small phial; and day after day as the collection is made it is placed for a short period in the sun, and after a sufficient quantity has been procured it is poured off clear, and of the color of amber, into small phials. Pure Attar when it has been removed only three or four days has a pale greenish hue; by keeping, it loses this, and in a few weeks time it becomes of a pale yellow. The first few days' distillation does not produce such fine Attar as comes off afterwards, in consequence of the dust or little particles of dirt in the still and the tube being mixed with it. This is readily separated, from its sinking to the bottom of the Attar, which melts at a temperature of 84°. From one lac of Roses it is generally calculated that 180 grains, or one tolah, of Attar can be procured; more than this can be obtained if the Roses are full sized, and the nights cold to allow of the congelation. The Attar purchased in the bazar is generally adulterated, mixed with sandal oil or sweet oil; not even the richest native will give the price at which the purest Attar alone can be obtained, and the purest Attar that is made is sold only to Europeans. During the past year it has been selling from

80 to 90 rupees the tolah ; the year before it might have been purchased for 50 rupees. Native stills are let out at so much per day or week, and it frequently occurs that the residents prepare some Rose-water for their own use as a present to their friends, to secure their being provided with that which is the best. The natives never remove the calices of the Rose flowers, but place the whole in the still as it comes from the gardens.

The best plan appears to me to have this removed, as by this means the Rose-water may be preserved a longer time, and is not spoiled by the acid smell occasionally met with in the native Rose-water. It is usual to calculate 100 bottles to one lac of Roses. The Rose-water should always be twice distilled ; over ten thousand Roses, water may be put to allow of sixteen or twenty bottles coming out ; the following day these twenty bottles are placed over eight thousand more Roses, and about eighteen bottles of Rose-water are distilled. This may be considered the best to be met with. The Attar is so much lighter than the Rose-water, that previous to use it is better to expose the Rose-water to the sun for a few days to allow of its being well mixed, and Rose-water that has been kept six months is always better than that which has recently been made.

At the commencement of the Rose season, people from all parts come to make their purchases, and very large quantities are prepared and sold. There are about thirty-six places in the city of Ghazeepore where Rose-water is distilled. These people generally put a large quantity of sandal oil into the receiver, the oil is afterwards carefully removed and sold as Sandal Attar, and the water put into carboys and disposed of as Rose-water. At the time of sale a few drops of sandal oil are placed on the neck of the carboy to give it a fresh scent, and to many of the natives it appears perfectly immaterial whether the scent arises solely from the sandal oil or from the Roses ; large quantities of sandal oil are every year brought up from the South and expended in this way.

The chief use the natives appear to make of the Rose-water

or the Sandal Attar, as they term it, is at the period of their festivals and weddings. It is then distributed largely to the guests as they arrive, and sprinkled in profusion in the apartments. A large quantity of Rose-water is sold at Benares, and many of the native Rajahs send over to Ghazeepore for its purchase. Most of the Rose-water, as soon as distilled is taken away, and after six months from the termination of the manufacture there are not more than four or five places where it is to be met with.

I should consider that the value of the Roses sold for the manufacture of Rose-water may be estimated at 15,000 rupees a year, and from this to 20,000, and from the usual price asked for the Rose-water and for which it is sold, I should consider there is a profit of 40,000 rupees. The natives are very fond of using the Rose-water as medicine or as a vehicle for other mixtures, and they consume a good deal of the petals for the conserve of Roses, or *Goolcund,* as they call it. There are several kinds of essential oils produced from the strong scented flowers in this district, which I will procure and send down to you.

ART. LV.—OBSERVATIONS UPON SYRUPS.

By M. Guibourt.

M. Emile Mouchon, a pharmacien at Lyons, having published, at the beginning of the year, a complete treatise upon *saccharoles* liquids, I was desired to present an account of the work in the *Journal de Chimie Medicale*, but other occupations have obliged me to postpone this labor; in the meantime most of the pharmaceutic repertories have announced and made known the treatise of M. Mouchon, so that a new announcement and analysis of it, would be at the present time superfluous. Nevertheless, many observations which have been suggested to me by this book, not having been made, and moreover, regarding it as an authority which is worth being balanced by others of the same order, I have taken advantage of this occasion to submit, for new discussion, all the formulæ of the syrups. It is the result of the examination made by me, that I shall present, in several articles, for the decision of pharmaceutists.

Simple syrup should naturally engage our attention in the first instance. It presents to me several questions to answer, either in relation to the proportion of the two components, water and sugar, or relatively to its areometric degree, to the mode of clarification, &c.

In the first edition of our Pharmacopœia, M. Henry, sen., and myself have admitted that boiling syrup, of 30° Baumé, (sp. weight 1262) should be, when cold, of 35°, or 1321, and that it was formed of two-thirds sugar and one-third water. Still later, however, Dr. Pector, a skilful mathematician, to whom I am indebted for judicious and exact notes upon the areometers which I have introduced into the second edition of the same work, has assured me that boiling syrup at 30° ought to weigh, when cold, but 34°, and that if it gave more by experiment, this was owing to the evaporation undergone during filtration and cooling; but

my experience not being in accordance with this calculation, I have admitted no change in our first exposition, and shall allow it to remain in the second edition of the Pharmacopœia. Still more recently M. Beral, in an interesting essay upon the syrup of cherries, has published the following table, upon the comparative composition and density of simple syrup.

Simple syrup.	*Boiling.*	*Cold.*
With 28 oz. of sugar,	30¼°	34¼
" 30 "	31	35
" 31 "	31¾	35¾.

Two inferences appear to be deduced from these results. First, that syrup, boiling at 30°, ought not to weigh, when cold, but 34; as was thought by M. Pector; next, that syrup when boiling at 30° contains less than 28 oz., of sugar, while it is admitted generally that it contains 32 ounces to 16 of water. It appears to me, however, that the definitive solution of these questions is not without interest to pharmaceutists.

In the first place, to determine the relation of the density of boiling syrups to cold, the following is the manner in which I have proceeded: Into a vessel full of boiling syrup, which was nearly done, I completely plunged a prover, so as to heat it to the same point as the liquid; I withdrew it from time to time in order to introduce the areometer, and at the same moment I observed the degree, by looking at it horizontally to the lowest part of the surface of the liquid, for the reasons set forth in the Pharmacopœia Raisonnée. When the syrup, thus inspected, and cooled as little as possible below 100°, just showed 30°, I closed the prover with a plate of glass, and the next day, having agitated the syrup in order to mix all the layers, and having exposed it in a cellar at a temperature of 15°, it weighed 35°. Thus nothing appears to me more certain than that boiling syrup at 30° weighs 35 at the temperature of 15° Centegrade.

In the second place, to determine the true composition in

water and sugar of boiled syrup, at 30°, or 35° cold, I took sugar of Santerie of the first quality, very white, very hard, sonorous, and of fine crystallization. I previously assured myself that this sugar, kept in a dry store-house, on the first floor, had lost nothing of its weight, by exposing it for two hours in a stove to a heat of 100°, so that it contained no water other than that of crystallization. I prepared three syrups by dissolving without heat in three close vessels, and in 16 ounces of water 28, 30, and 32 ounces of coarsely pulverized sugar. The 28 ounces of sugar were completely dissolved in a few days, but not the others. I then heated equally the three vessels until the solution was completely accomplished in all, and allowed them to cool.

To an eye which is accustomed to the way in which syrups are affected by the movement given to the vessels in shaking them, it is evident that the syrup prepared with 28 ounces is less consistent than that of common sugar ; and in addition, it acquires in a few days a disagreeable taste, and cannot be kept for any length of time ; it is not less certain that the one prepared with 32 ounces is too thick, and I doubt not that it would be susceptible of crystallizing at the end of a little time ; lastly, by agitation alone, it can be determined that the syrup prepared with 30 ounces is the best one.

At 17° C. I have determined the specific weight of the three syrups, and found them as follows:

	Density.	*Areometrical degree.*
Syrup of 28 oz.	1.311	34.20
30	1.320	35 hardly,
32	1.323	35.15.

The areometer which I used marked 34½, 35 and 35¼, as I had before obtained with the same instrument 34½, 35 exactly, and 35½. Thus the syrup of 30 ounces still represents here that concentrated of 35 degrees when cold, corresponding in my first experiment to 30° boiling.

Apparently we should arrive at another result, if it were

desired to take the degree of the preceding syrups, by heating them in a water bath. Having heated them in this way and quickly weighed then in a prover, itself heated in boiling water, I have found

	Hot.	*Cold.*
For syrup of 28 oz.	31°	34½
30	31⅛	35
32	32½	35½.

But I satisfied myself that the syrup heated in a flask by means of a salt water bath, was not elevated beyond 90°, and that after its transfer to the prover it was not above 85°. It is at this temperature that the results above stated have been determined, which explains the less marked difference presented in the cooled syrup.

At another time, I heated three similar flasks in a boiling bath of hydrochlorate of lime, the syrups were elevated to 105°, and underwent commencing ebullition. Poured into a prover and weighed as rapidly as possible, that of 28 ounces marked 31 degrees, and that of 32 ounces 32¼°; the other had been lost. These experiments, not very exact, cannot counterbalance the first, where the syrup, taken in quantity when boiling, is weighed immediately and guarded from evaporation until it has completely cooled. To resume. I regard it as certain that simple syrup of 30° when boiling, weighs 35° when cold, and that this syrup, which I call *normal*, contains only 30 ounces of crystallized sugar to 16 ounces of water.

Clarification by Albumen.

A great number of writers upon pharmacy, recommend us to melt the sugar over a fire in the largest proportion of the water to which albumen has been added. But even the precaution indicated of not bringing the liquid to the boiling point until the sugar is completely melted, evinces one of the vices of this method, which consists in this that the sugar not being ever completely dissolved before the coagulation of the

albumen, it carries with it a considerable proportion into the scum formed. I may say further, that pharmaceutists who have recommended this proceeding, have had no idea of the important part which the air performs in albuminous clarification. The albumen in coagulating, forms truly, as it is said, a tissue which catches and collects heterogeneous particles suspended in the liquid. But it is in the first instance the air introduced into the albumen, by beating it, which by expanding with heat, renders the scum lighter than the liquid, and forces it to rise to the surface ; without it the albumen would remain suspended in the syrup, or when cold be precipitated, as in the clarification of wine, by albumen beaten in the same way, but not heated. When, therefore, sugar and water containing albumen are placed together over a fire, a portion of the interposed air is disengaged before ebullition, and becomes useless, while on the other hand, by reserving as I have recommended to be done, all the albumen to pour it in parts, and *from a height* into the syrup when boiling, the quantity of interposed air is augmented, and also the power communicated to the albumen of bringing the impurities of the syrup to the surface. By operating thus, the maximum effect of clarification is obtained with a given quantity of albumen, and more product.

Finally, in observing what occurs, when at the termination of clarification, there is added pure aerated water to bring to the surface the remainder of the albumen and substances which float in the syrup, the idea has struck me that aerated water might alone be sufficient for the clarification of sugar ; and in fact, having dissolved a loaf of common sugar, of the weight of 6 k. 260, in 3 kil. of water, having carried it to ebullition, having skimmed it, and having poured in, at ten different times, by portions, the quarter of a litre, 2 k. 500 of filtered water, I effected the complete clarification of the syrup, with the removal of a quantity of scum which did not weigh more than 4 oz. I do not recommend, however, the employment of this method, on account of the time which it takes, and because, in truth, the scum is more easily removed when

it is united with coagulated albumen, which collects from the interposed air; but I give it as a proof of the action exerted by the air in clarifying a given quantity of albumen, and of the superiority of the method which adds to a given quantity of albumen, the greatest possible quantity of atmospheric air.

Journ. de Chimie Medicale.

MISCELLANY.

On the best means of burning gas for heat. By Sir John Robison, K. H., Sec. R. S. E., M. S. A.*

"Vix ea nostra voco."

When carburetted hydrogen gas is employed in producing heat, it i seldom required that it should at the same time give out light; the combustion may, therefore, be managed in any mode which may be convenient without seeking to preserve the illuminating power. It appears to have occurred about the same period to Dr. Duncan and to myself, that, by passing a current of gas, mixed with atmospheric air, through a wide vertical tube, having its upper end covered' by a diaphragm of wire gause, and by kindling the mixture as it escaped through the interstices of the wire cloth, a convenient stove might be formed for culinary purposes. Dr. Duncan applied some small apparatus on this principle to pharmaceutical operations in his class room, and I had my kitchen furnished with a range of large stoves, which were intended to supersede the use of French charcoal stoves in various culinary processes. In both cases the success has been perfect, and the same principle has been adopted with advantage in a variety of processes in the useful arts, where this neat and cleanly method of applying heat has rendered it a valuable acquisition to the work shop. The form of the apparatus may be varied in any way to suit the particular process to which it is applied; as all that is essential is, that a current of the mixed gas and air shall rise through wire cloth, and that the proportion of gas to atmospheric air shall never be so great as to allow the flame to become yellow, as, with this precaution, the combustion of the carburetted hydrogen will be complete, and no deposit of soot will take place on cold bodies when set over the flames; the proper quantity of gas in the mixture is easily determined by the stop cock belonging to each stove.

For ordinary purposes, the cylinders may be thirty inches long and three or four inches in diameter, and the wire cloth for the stove should have thirty wires to the inch. That which is manufactured for safety lamps answers well for this purpose.

Whenever from accidental injury or decay, a hole takes place in a

* Read before the Society of Arts for Scotland. The special thanks of the Society were awarded to the author.

diaphragm, it is no longer possible to use it; as when lighted, the flame passes through the fracture, and communicates with the flame at the bottom of the cylinder, which then burns like an ordinary gas light, and like it, would blacken the surface of any cold body presented to it. The wire cloths, if not broken through by violence, will last for months although in daily use; and if covered by a layer of coarse sand or pounded lime stone, will continue serviceable for an unlimited period.

When more intense heat is required than is attainable by the unaided combustion of the mixed gases, recourse may be had to various forms of blow pipes; and when a large volume of such flame is to be employed, the current of atmospheric air may be urged by double bellows. A very efficient apparatus on this principle is to be seen in the laboratory of Dr. B. Reid.

It is to be regretted, that such applications of gas are not more generally known and introduced into work shops, as there are numerous processes in the arts in which they would afford facilities to the workman which he can scarcely command by any other means. For example, in the hardening of steel tools, it is well known that a piece of bright steel, when heated to redness in a forge or muffle, is subject to oxidation and that a black scale remains after hardening, which it is difficult to remove without some injury to the work, as in the case of a screw tap; whereas, if the same piece of steel be heated in a flame of the mixed gases, where there is no free oxygen to attack its surface, it may be *made and kept* red hot without injury to its finest edge; it will be discolored, but without losing much of its polish. The artist has also the advantage of a distinct view of the article while it is being heated, and the power of withdrawing it from the flame the moment it has acquired the proper color, which, in the hardening of cast steel cutting tools, is of great importance.

Many attempts have been made to apply carburetted hydrogen and pure hydrogen gases to the purposes of warming buildings, and various forms of stoves have been proposed, on the understanding, it would appear, that, by applying the flame of the gas to the metallic bodies an increased degree of heat would be communicated by them to the atmosphere around. A little consideration will show, that however the *distribution* may be modified by such contrivances there can be no increase of the heating power; and that when a certain measure of gas is fairly burned, the heat evolved into the apartment will be the same whether the flame be disposed as a light, or made to play against metallic plates or other combinations of apparatus. In all cases where the products of combustion are allowed to mix with the atmosphere of the apartment, without provision being made for carrying them off by ventilation, the effects of such processes must be more or less deleterious to health, according to the proportion these products bear to the mass of air they mix in. On the whole, it may be assumed, that this mode of heating apartments is the most expensive,

the least efficient, and, excepting that by Joyce's charcoal stove, the most insalubrious that can be resorted to.

Edin. New Phil. Journ.

Analysis of the ashes of the Salsola tragus. By M. Guibourt.—M. Rayer having lately obtained a pretty considerable quantity of the *salsola tragus*, to experiment with, in calculous affections, M. Guibourt burnt a certain quantity of it, and subjected to analysis the fixed products of this incinneration. He found them formed of

Carbonate of potassa,	29.04
Chloride of potassium,	17.89
Sulphate of potassa,	4.93
Carbonate of lime,	40.26
Phosphate of lime and oxide of iron,	7.88
	100.00

These results are very remarkable, since they determine the existence of potassa, to the exclusion of soda, in a plant growing upon the borders of the sea, and appertaining to a botanical genus especially characterized by the production of soda.—*Journ. de Pharm.*

Note apon Quinine. By M. H. Magonty.—An accidental circumstance has led M. Magonty to study the influence of ammonical salts upon Quinine treated at different degrees of temperature; thinking, like him, that all that relates to the alkaloid of Cinchona should be interesting, we report the conclusion to which his observations have led him.

1. Quinine is more soluble in water than is generally thought, and the solution is greater by heat than cold.

2. Quinine is dehydrated in the midst of water carried to 60°.

3. Quinine is easily crystallized by means of water, when by the aid of alcohol this result is very different.

4. Ammonia decomposes, when cold, the salts of Quinia but partially, the same is the case with magnesian salts, and in turn the ammonical salts are decomposed by Quinine by aid of ebullition in water.

Journ. de Ch. Med.

SWAN'S ATMOSPHERIC SODA FOUNTAIN.

Patented November 3, 1838.

This article is a new apparatus for the preparation of soda water. It has been used for more than four years past, by the inventor and proprietor, with entire success, and has also been employed during the seasons of 1836–7, and 8, by a number of other individuals in various parts of the United States, to whom it has not only given entire satisfaction, but they have expressed themselves as highly gratified with its operation. It has also been submitted to the examination of several scientific gentlemen, who have given favorable opinions in regard to it.

For a particular description of the apparatus and manner of using, see American Journal of Pharmacy, Vol. 3d, new series, page 184.

The advantages of the *Atmospheric Fountain* over the old method, are, the economy of its apparatus, the original cost to the purchaser being about one-quarter that of the old Fountain.

Its simplicity of construction, being such that any one of ordinary capacity can readily understand its operation and management.

The trifling expense of materials for supplying it, together with the small amount of labor required, and its compact form.

The proprietors are aware of the perplexity and inconvenience attending the manufacture of soda water with the complicated forcing pump and apparatus generally in use, especially in small cities and towns, where the sale of this beverage is limited, and consequently the business cannot be made profitable, owing to the original cost of an apparatus, together with the trouble and expense of keeping it in operation.

They therefore recommend the *Atmospheric Soda Fountain* with confidence, satisfied that a trial will fully sustain the favorable opinions expressed by gentlemen who are either theoretically or practically acquainted with its merits.

CERTIFICATES.

The undersigned are acquainted with Mr. Swan's new method of preparing soda water, and have frequently drank from his Fountain. We have full confidence in the ability and integrity of Mr. Swan, in matters of this kind, and have observed that the soda water prepared by him as a beverage during the warm season has been of an excellent quality, and in our opinion superior to that made by the old process.

John D. Henry, M. D.
F. F. Backus, M. D.
Erastus S. Marsh, M. D.
James W. Russell, M. D.
Henry A. De Forest, M. D.

Rochester, February, 1838.

I have before made use of the old apparatus, by which the Fountains were charged with Gas, from the Patent Gas Generator. During the past summer, however, I used one of your Fountains with very great satisfaction. The advantages which I conceive your apparatus has over the old Fountains, are—

The safety and ease with which a constant supply can at all times be kept up.

The low price, as compared with the old one, being only about one-sixth the price of a Generator and Fountain.

The expense of preparing the water for use, being not more than one-fourth as much as the old plan, while the labor is very much lessened.

I would state as an instance of the difference of labor required, that in one day, with the labor of only replenishing the reservoir, I drew 800 glasses of water. The same product on the old plan would have required at least the charging of four fountains, which is attended with much labor, loss of time, and danger.

In towns and villages, where the demand is limited, the Atmospheric Fountain must, for these reasons, be entitled to decided preference.

Yours,

THOMAS S. BUTLER, Chemist and Druggist.

Columbus, 14th Dec., 1838.

—

We have used one of Mr. Swan's *Atmospheric Soda Fountains*, and are perfectly satisfied with its construction and operation. We would cheerfully recommend it to the notice of the public as the cheapest and most convenient apparatus with which we are acquainted.

HOYT & MAY, Physicians and Druggists.

Palmyra, (*N. Y.*) Oct. 4, 1837.

—

For the last two seasons, I have used your *Atmospheric Soda Fountain* to my entire satisfaction, and I think to the satisfaction of my customers. I shall continue to use it in preference to the Gas Fountain, as I consider it equally as well adapted to the purpose for which it is intended, and far more economical.

Yours respectfully,

WILLIAM SEAVER, Druggist.

Batavia, (*N. Y.*) Nov. 20, 1836.

—

In answer to your inquiries as to our opinion of the *Atmospheric Soda Fountain* purchased of you, having used it for the past season, we can truly say that we consider it the most simple, easy managed, and best apparatus of the kind now in use.

Respectfully yours,

HOUGH & FULLER.

Syracuse, (*N. Y.*) Nov. 17, 1838.

—

The Fountains are manufactured and put up for transportation, complete, and ready for use, with necessary directions, &c., by the proprietors. Price $60.

L. B. SWAN & Co., Rochester, (N. Y.)

Also, for sale by their agents, CHARLES ELLIS & Co., Druggists, No. 56 Chesnut street, Philadelphia; GEORGE D. COGGESHALL, Druggist, No. 421 Pearl, corner of Rose street, New York.

THE

AMERICAN JOURNAL

OF

PHARMACY.

JANUARY, 1841.

ART. LVI.—ON THE HYDRARGYRO-BINIODIDES OF POTASSIUM, THE YELLOW IODIDE OF MERCURY, AND A COMPOUND OF BINIODIDE OF MERCURY AND AMMONIA.

By Ambrose Smith.

A compound of biniodide of mercury and iodide of potassium, was discovered by Bonsdorf, and designated by him, in accordance with his views respecting these and similar combinations, iodo-hydrargyrate of potassium, terminating the electro negative in *ate;* according to Berzelius, whose nomenclature is generally adopted here, it is made to terminate in *ide*. For a more detailed account of these compounds, we are indebted to Polydore Boullay. In a paper addressed to l'Académié des Sciences in Paris, giving an account of a series of mercurial double iodides, in which the iodides of mercury and potassium are included, this able chemist first states in general terms, that, by dissolving as much biniodide of mercury in the saturated solution of the electro-positive iodide as it will take up with the aid of heat, a salt is formed which consists, estimating its composition by the quantity of iodide employed, and of biniodide dissolved, of

One atom of the electro-positive iodide, and
Three atoms biniodide of mercury.

On cooling, the solution deposites one-third of the biniodide of mercury in crystals, and a salt remains in the liquor which may be obtained in crystals by evaporation.

These crystals, in the case of biniodide of mercury and iodide of potassium, resemble crystallized sulphur, and consist of

1 atom iodide of potassium,
2 " biniodide of mercury,
6 " water.

They are decomposed by water, one-half of the biniodide precipitating, and the salt which remains consists of

1 atom iodide of potassium,
1 " biniodide of mercury.

The substance of the above is taken from an abstract of Boullay's paper, published under the authority of l'Acad. des Sciences, in the Journal de Pharmacie, tome 13me, p. 435.

As the results of some experiments I have made on these double iodides lead to somewhat different conclusions, I will present them in detail, premising that M. Boullay's chief object in his paper was to illustrate the theory of electro-chemical combination, by an examination of the double iodides generally, and that his attention does not appear to have been particularly directed to those of biniodide of mercury and iodide of potassium.

1st. To a saturated solution of KI, as much HgI^2 was added as it would dissolve at a boiling temperature, by which a solution was obtained containing

165 parts KI,
385 " HgI^2,

which is a little more than three atoms HgI^2, to four atoms KI. From this solution, on cooling, HgI^2 is rapidly deposited, but if it be boiled nearly to dryness, a yellowish crystalline mass results, containing all the HgI^2.

Thinking a larger portion of HgI^2 might be taken up if it

had been recently precipitated—to a hot solution of KI, $HgCl^2$ was added; the HgI^2 resulting was first precipitated, and then re-dissolved in the liquor. By this means, in a solution of

165 parts KI,
90 " $HgCl^2$

were dissolved. This was as much as could be taken up, as when more $HgCl^2$ was added, it remained unacted upon. It is in the proportion of three atoms KI to one atom $HgCl^2$; as two atoms KI are decomposed by reaction with one atom $HgCl^2$ forming one atom HgI^2 and two atoms KCl, the solution contained

1 atom HgI^2
1 " KI,

together with two atoms KCl.

The double salt, therefore, containing the highest proportion of HgI^2, which I have been able to obtain, consists of HgI^2+KI.

2d. On allowing the hot solution containing 385 parts HgI^2, and 165 parts KI, to cool, 165 parts HgI^2 crystallized from it. The clear liquor was poured off from the free HgI^2, and concentrated by evaporation; on cooling, the double iodide was obtained in long, yellow, flattened prisms, resembling crystallized sulphur. These crystals, by synthesis, are composed of 220 parts HgI^2, and 165 parts KI. They were analysed by heating them in a tube closed at one end, first, gradually to drive off the water of crystallization, and then, with a stronger and carefully regulated heat, in order to sublime the HgI^2, taking care that it should all condense in the upper portion of the tube. When all the biniodide had sublimed, the tube was divided between it and the KI, which remained at the bottom, and the products were carefully weighed. 100 parts of these crystals, by a mean of several analyses thus conducted, are composed of

53.65 parts HgI^2	which correspond very nearly with	1 atom	HgI^2	454.6
41.85 " KI		2 "	KI	330.9
4.50 " HO		4 "	HO	36.
100.00				821.5

It is, then, the di-hydrargyro-biniodide of potassium crystallizing with four atoms of water.

In order to ascertain whether, by the use of alcohol, crystals of the double iodide could be obtained containing a larger proportion of HgI^2, to a saturated solution of KI in this liquid, as much HgI^2 was added as could be dissolved. On evaporating, a considerable portion of HgI^2 was gradually deposited, from which the liquor was poured off when it was sufficiently concentrated. The crystals thus obtained, were orange yellow, becoming orange red on drying, and evidently contaminated with free HgI^2. The proportional result of their analysis was 7 parts, HgI^2, to 5 parts KI, so that it nearly corresponds to the preceding compound.

A salt, however, may be formed, containing nearly one atom, HgI^2, to one atom, KI, by boiling down the hot saturated solution as before stated, but if the temperature is allowed to diminish during the evaporation, a portion of HgI^2 is precipitated.

The di-hydrargyro-biniodide of potassium is decomposed when dropped into water, a portion of HgI^2 being precipitated which may be re-dissolved by agitation, or a gentle heat; and the solution thus formed is not again precipitated by dilution.

If the water is gradually added, so as to make at first a saturated solution, the double salt is dissolved without decomposition.

100 parts of the crystals of HgI^2+2KI, when dropped into water precipitated 13. parts HgI^2. The solution remaining was evaporated to crystallize. Crystals were thus obtained, which by synthesis (with which their analysis corresponded) are composed of $HgI^2+2\frac{1}{2}KI$. These crystals were soluble in water, gradually added, but when dropped into water were decomposed,

a portion of HgI_2 being precipitated as before. The liquor resulting was filtered, and when evaporated to dryness the product was not decomposed by water, but when slowly evaporated, crystals of double iodide were obtained, associated with cubic crystals of free KI.

Solutions were then made containing 1 equiv. HgI^2, to $2\frac{1}{2}$, 3, and 4 equiv. KI. These solutions were concentrated by slow evaporation, and in each case the crystals were associated with cubic crystals of free KI; from these the crystals of the double iodide were separated, in each case were partially decomposed when dropped into water, and on analysis were found to consist of 1 atom HgI^2, with a little more than 2 atoms KI, and about 4 atoms HO.

A double salt was then examined, which had been prepared in considerable quantity, and crystallized by spontaneous evaporation, from a large quantity of mother liquor. It was found to be readily soluble in any proportion of water, without decomposition. This being analysed gave

50.65	parts	HgI^2	nearly	1 atom		HgI^2
40.65	"	KI	corresponding	2 +	"	KI
8.70	"	HO	with	8	"	HO
100.00						

The result of these experiments lead us to conclude that the double salt, containing the largest proportion of KI which can be combined, consists of HgI^2+2KI, that it crystallizes with from 4 to 8 atoms of water of crystallization, that when crystallized with 4 atoms, it dissolves in water, which is gradually added, but is partially decomposed when this is suddenly poured upon it, and that when it contains the larger proportion of water of crystallization, it is dissolved without decomposition in any proportion of water.

To recapitulate the above results, I have been able to obtain two compounds only of biniodide of mercury, and iodide of potassium.

1st. The hydrargyro-biniodide of potassium, HgI^2+KI.

2d. The di-hydrargyro-biniodide of potassium, HgI^2+2KI.

Compounds intermediate in composition may be obtained, by allowing the solution of the former to deposite a portion of its HgI^2, by partial cooling, and evaporating nearly to dryness. These are mixtures in various proportions of HgI^2+KI, and HgI^2+2KI, which crystallize together being apparently isomorphous. My friend Wm. Procter, jr., who has repeated and confirmed the results of most of the preceding experiments, obtained a compound of $2HgI^2+3KI$, in a yellow crystalline mass.

The di-hydrargyro-biniodide of potassium, was introduced to the notice of the medical profession by Dr. Channing, of New York, by a paper published in the Amer. Jour. of Med. Sciences, in the year 1834, since which it has been been considerably used by some physicians in this city, with favorable results. It is no doubt a valuable compound where a soluble persalt of mercury is required, and may be eligibly substituted for the corrosive chloride of mercury, when the administration of an iodide is also indicated.

The ready solubility of the crystals without decomposition seems to depend upon their containing a large proportion of water of crystallization, and this object is best obtained by preparing it in considerable quantity and crystallizing by spontaneous evaporation. When wanted in crystals, it may be prepared by dissolving 1 equiv. biniodide of mercury, in a a strong solution of a little more than 2 equiv. iodide of potassium, filtering the liquor, and evaporating as above indicated. It is usually employed in solution, which may be conveniently made from the proximate elements of the compound.

Take of Biniodide of Mercury,
Iodide of potassium, each, 4 grs.
Water, one fl. oz.
Dissolve and filter the solution.

This is about the strength usually employed here. The dose is from two to six drops, equivalent to from about the thirteenth to the twelfth of a grain of the double salt.

A slight excess of the iodide of potassium is here indicated,

but a very dilute solution of it will scarcely dissolve a larger proportion of the biniodide, and as the iodide of potassium of commerce, is seldom quite pure and dry, it not unfrequently happens that a little more is required.

The double salt, may also be prepared by dissolving one equiv. bi-chloride, or per-nitrate of mercury, in a solution of four equiv. of iodide of potassium, evaporating to dryness and dissolving the double iodide from the hydro-chlorate or nitrate of potassa, by means of alcohol. The process previously indicated is most eligible. When made from the per-nitrate of mercury, it is liable to contain nitre, and as this salt is nearly isomorphous with the double iodide, a considerable portion may crystallize with it without altering materially the appearance of the crystals. It may, however, be detected by its insolubility in strong alcohol.

Composition of the yellow iodide of mercury.—When dissolving biniodide of mercury in a solution of iodide of potassium, a portion of the yellow or the green iodide of mercury, was found to precipitate. This is probably owing to the biniodide gradually loosing iodine on keeping—5 to 10 per cent. was precipitated from some which had been kept some time, while from a portion which had been recently prepared little more than one per cent. was separated.

If the HgI^2 be in excess, the precipitate is the yellow iodide, but if there be a slight excess of KI, it is the protiodide.

The yellow iodide contains 3 atoms I, and 2 atoms Hg. It is stated in the chemical authorities which I have consulted, to be the sesqui-iodide of mercury. The readiness with which it is converted into HgI^2 and HgI, led to some further experiments with it.

When sublimed, I have found it to be invariably converted into HgI^2 and HgI.

Heated in a solution of chloride of sodium it is decomposed, the solution dissolving HgI^2, and leaving HgI.

When treated with repeated portions of strong boiling alco-

hol, it is also decomposed, HgI^2 is dissolved, and may be obtained by evaporating the alcohol, and HgI remains.

On referring to Boullay's paper on the double iodides, before mentioned I find that observations nearly similar have induced him to consider it a compound of the biniodide and iodide of mercury, and this appears its more probable composition, as it is scarcely to be supposed that the action of such feeble re-agents, would occasion its conversion into the biniodide and protiodide, if these did not previously exist in it. If this be the case it is a compound of 1 atom of biniodide and 1 atom of protiodide of mercury, united by the feeble affinity which would *a priori* be supposed to exist between substances approaching each other so nearly on the electro-chemical scale, and its formula is HgI^2+HgI.

A compound of biniodide of mercury and ammonia.—On adding ammonia in excess to a solution of the di-hydrargyro biniodide of potassium, I noticed a white precipitate to form. When the solution was concentrated the precipitate was dense, consisting of minute white acicular crystals; when a diluted solution was employed, no precipitate at first ensued, but upon standing, long snowy needles crystallized from it. These crystals were decomposed on drying, ammonia being evolved and biniodide of mercury remaining, which still retained the shape of the crystals, but had lost their consistence, falling to powder on the slightest friction. A similar change was rapidly produced by washing them with water, the white compound being first converted to an orange color, and, by further washing, to the brillant scarlet red of the biniodide of mercury.

The same compound is formed by digesting biniodide of mercury, with the aid of heat, in a large excess of strong aqua ammonia, or ammoniated alcohol, by which the biniodide is dissolved; upon cooling the liquor, the white double salt crystallizes from it.

The evanescent nature of this compound rendered it difficult to analyze, as it was found impossible to dry it without decomposition, even at a low temperature, under an air-pump.

It appears to require the presence of free ammonia for its preservation. In order to ascertain, approximately, its composition, a portion of it, as free from uncombined ammonia as possible, was put into water and shaken, by which it was decomposed, ammonia being dissolved, and biniodide of mercury subsiding. The latter was dried and weighed, and the ammonia contained in the water carefully neutralized with crystallized tartaric acid. The HgI^2 weighed 6.0 parts. The liquor required 2.0 parts $(\bar{T}+HO)$ for saturation, which, by calculation, indicates .454 parts ammonia, that is

6.000 parts HgI^2	corresponding	1 atom HgI^2	454.6
.454 " NH^3	nearly with	2 " NH^3	34.30

After the above had been prepared, my attention was directed by one of the editors of this Journal, to Professor Kane's researches respecting the ammoniacal chloride of mercury; from the similarity of the mode of formation of this compound, it seemed probable that its composition might also be similar, and in order to ascertain whether this was the case, some further experiments were made.

When to a solution of 2 atoms of bichloride of mercury, 4 atoms of ammonia are added, the whole of the mercurial salt is precipitated, and 2 atoms of hydrochlorate of ammonia remain in solution. According to Professor Kane's views, the chlorine of the hydrochlorate of ammonia is furnished by the decomposition of 1 atom of the bichloride, the hydrogen by the decomposition of 2 atoms of ammonia, leaving amidogen, (a hypothetical compound of 1 atom of nitrogen and 2 atoms of hydrogen,) 2 atoms of which combine with 1 atom of mercury, forming the bi-amidet of mercury, which unites with the remaining atom of bichloride of mercury to form white precipitate, $(HgCl^2+Hg2NH^2.)$ Accordingly, Professor Kane found when white precipitate was decomposed by heat, 2 atoms chloride of mercury remained, and the ammonia and nitrogen which were driven off, were in the proportion to form 2 atoms of amidogen.

With a view to ascertain whether similar phenomena were

exhibited by the ammoniacal biniodide of mercury, the following experiments were tried, the great difficulty of procuring it clear of water, and free ammonia rendering it impossible to arrive at an exact analysis.

1st. 10 parts HgI^2 were digested with heat in aqua ammonia until it was dissolved, the liquor cooled, and the double salt, which crystallized from it, separated. These crystals upon drying, (by which they were decomposed,) gave 8.40 parts, HgI^2. The liquor was then boiled until all the free ammonia was driven off, and fused nitrate of silver added until it ceased to produce a precipitate. This required 1.11 parts $\dot{A}g\overset{:\cdot:}{N}$, which, by calculation, indicates (170.15 : 1.11 :: 126.3 : .824) .824 parts I, and as 1.60 parts HgI^2, which contain .90 parts I, remained in solution, we may conclude there was no hydriodate of ammonia formed.

2d. Into a tube, closed at one end and bent, was put a portion of the compound, still moist, and heat applied; the gases liberated were collected over mercury; these, on examination, appeared to consist wholly of ammonia and aqueous vapor. The scarlet powder remaining was soluble in alcohol, and solution of iodide of potassium, and sublimed by heat in yellow crystals, which became scarlet red on cooling—being evidently biniodide of mercury.

From this we may conclude that it is not an analogous compound to white precipitate. It appears to consist, as before stated, of 1 atom HgI^2, with 2 atoms NH^3, probably directly united; if this be the case, its formula will be HgI^2+2NH^3.

Not finding any notice respecting this compound in any of the chemical works to which I had access, I had at first supposed that it had not been hitherto observed, but have since seen, in the Annal. de Chimie et de Phys., a paper by Rose*—"on the combinations of ammonia with the anhydrous salts"—in the course of which, he states, that—"the red

* Annales de Chimie et de Ph., tome lxii. Des Combinaisons de l'Ammoniaque avec les sels anhydres. Par Henry Rose.

color of periodide of mercury is changed when in contact with gaseous ammonia to a dull white." He found .784 grammes of periodide of mercury in an atmosphere of gaseous ammonia, to absorb .055 grammes of the gas, from which he calculates the compound to contain 1 atom periodide of mercury, and 2 atoms (" *deux atomes simples ou un atome double*") of ammonia.

The description of this combination, as given by Rose, agrees very well with that above mentioned, and they are no doubt identical.

The orange coloured salt, formed by the action of a limited portion of water upon this compound, contains less ammonia, and is probably composed of 1 atom HgI^2 with 1 atom HN^3.

ART. LVII.—ON THE TARTRATE OF IRON AND AMMONIA.

By William Procter, Jr.

Several druggists of this city having been called upon for *tartrate of iron and ammonia*, which, from its novelty in a medical point of view, was not to be obtained, I have been induced to make some inquiry into the character of the salt, and ascertain an eligible process for its preparation, in case it should gain favor with the medical profession. The absence of all notice of it, in any of the chemical works usually to be obtained, is the motive for entering so much in detail.

The process for preparing the tartrate of iron and *potassa*, published in the last number of this journal, has been taken as a type in the formation of the succeeding formula, and the advantages of that process apply with equal force to the one under consideration.

The first step is to form the *bitartrate of ammonia*, as this salt is not, like the analogous one of potassa, ready at hand. It is readily made by dissolving four equivalents of tartaric acid in a suitable quantity of water, and adding gradually, one

equivalent of sesqui-carbonate of ammonia. The reaction is such, that the two equivalents of ammonia in the sesqui-carbonate, combine with the four equivalents of tartaric acid, forming two equivalents of bicarbonate of ammonia, while three equivalents of carbonic acid and a portion of the water of the tartaric acid is set at liberty. Like the bitartrates of the other alkalies, this salt is but slightly soluble in cold water; and it comports itself, when mixed with sesqui-oxide of iron, in a manner similar to cream of tartar.

Take of tartaric acid	100	drachms.
Sesqui-carbonate of ammonia (crystalline)	39⅓	"
Sesqui-oxide of iron	53⅓	"
Hydrochloric acid	180	"

Solution of ammonia and water, of each a sufficient quantity.

Dissolve the tartaric acid in a gallon of the water, and add the carbonate of ammonia gradually. A considerable quantity of a white crystalline powder subsides, which is bitartrate of ammonia, and with which the supernatant liquid is saturated.

Dissolve the sesqui-oxide (precipitated carbonate U. S. P.) of iron in the hydrochloric acid, by means of a gentle heat, dilute the solution with six pints of water, and add a sufficient quantity of solution of ammonia to precipitate the sesqui-oxide. Separate this on a flannel filter, wash it with water until the washings pass tasteless, and add it to the solution containing the bitartrate of ammonia; then apply a gentle heat, by means of a water bath, until the whole of the sesqui-oxide of iron is dissolved, and a deep reddish-brown solution results. The solution thus obtained should be evaporated, by means of a water bath, to dryness. It is of importance to the excellence of the product, that a moderate heat be employed, and that of a water bath is the best and most easily regulated.

It will be observed that the carbonate of ammonia is directed to be in a crystalline form, because, when it has fallen into powder, or lost its transparency, it has become more or

Fig. 1.

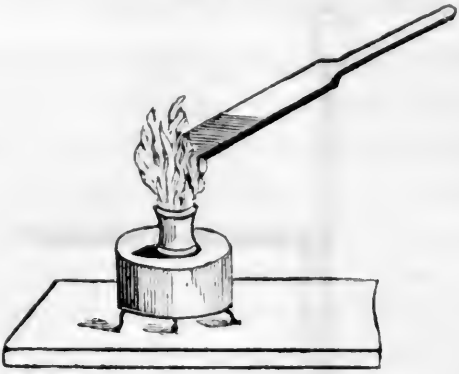


Fig. 2.

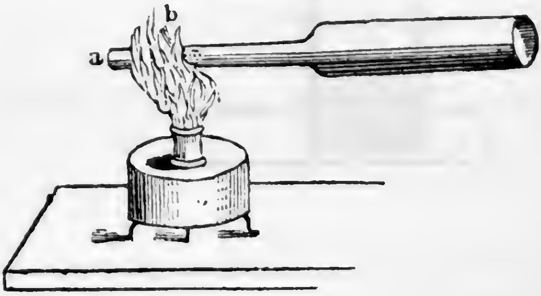


Fig. 3.

Fig. 4. Fig. 5.

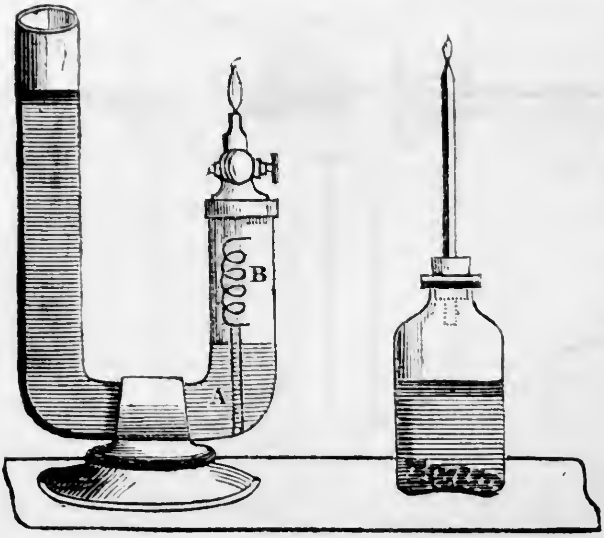


Fig. 6.

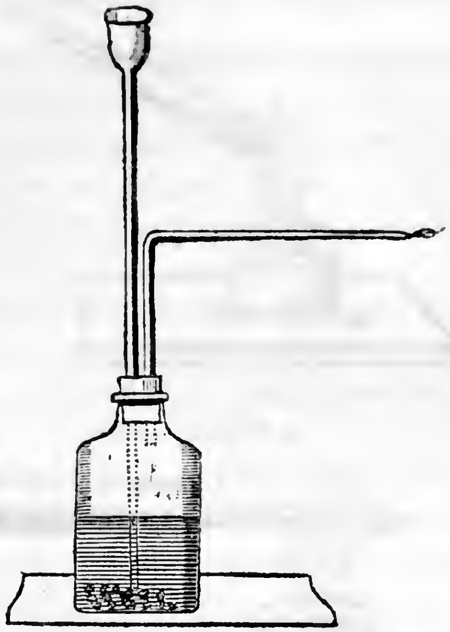
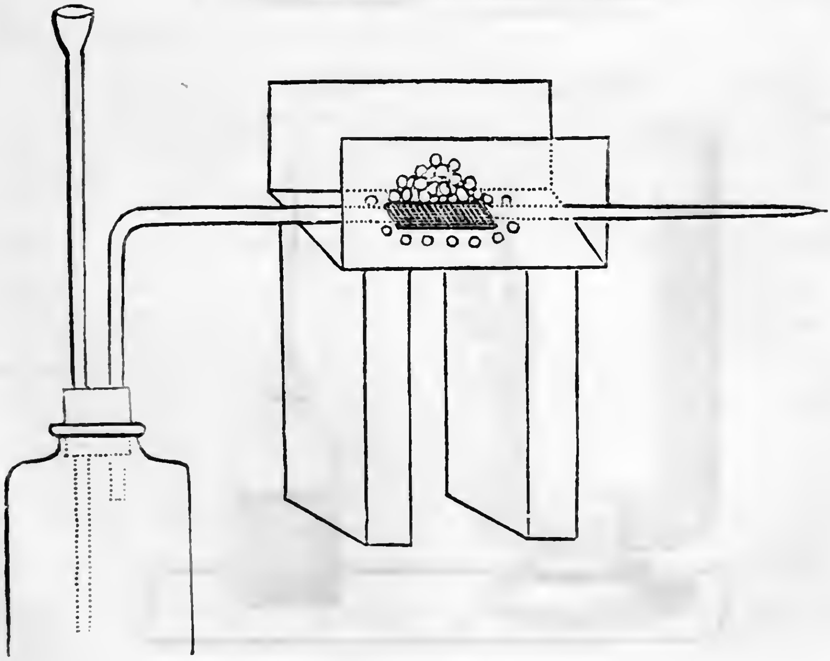


Fig. 7.



less a *bicarbonate*, which contains much less of the volatile alkali than the sesqui-salt.

In case the crystalline carbonate is not at hand, take half the tartaric acid, saturate it with the ammoniacal carbonate, in whatever state it may be, and then add the remainder of the acid.

When the quantity prepared is small, and the evaporating vessel is shallow, the salt is obtained in brilliant scales of a dark brown color in mass; but when held between the eye and the light, a beautiful garnet hue. When, however, the quantity is considerable, it presents the form of angular grains resembling kino. Its powder has a brown color, like iron rust. It is very soluble in water, requiring rather more than its weight of that fluid at 60° Fahr. for complete solution; but to effect this, it is necessary that they be in contact for many hours. When a solution of this tartrate is boiled, no change takes place, and it is consequently more stable than the tartrate of iron and potassa. Like that last named, this salt is insoluble in anhydrous alcohol, and is precipitated from its aqueous solution by it of a dull yellow color. It is totally insoluble in ether, the grains not even agglutinating together when mixed with it.

Notwithstanding an approximative idea may be formed of the composition of tartrate of iron and ammonia, from its synthesis, yet to ascertain more definitely its composition, as regards the water and sesqui-oxide of iron it contains when made by the foregoing formula, the following experiments have been made.

One hundred parts of the salt, in powder, contained in a capsule surrounded by warm sand, was placed in vacuo over a surface of sulphuric acid, until it ceased to lose weight, which required nearly three days. The loss, by this treatment, was 15.7 parts, which is more than four equivalents of water. It is evident, however, from the character of the salt and process, that the amount of water it contains, depends much on the length of time the heat is applied in its evaporation.

When 30 grains of the hydrous salt was carefully incinerated, a residue of 8.70 grains of sesqui-oxide of iron was obtained; 30 grains of the hydrous tartrate is composed of 25.29 grains of dry salt, and 4.71 of water; then, theoretically, the quantity of sesqui-oxide in 25.29 grains of the anhydrous salt is 8.83 grains, nearly that obtained by experiment.

An aqueous solution, containing a known weight of the double tartrate, was precipitated by alcohol 40° Baumé. The precipitate, when collected and dried, was found to have lost weight nearly in proportion to that dried in vacuo. A portion of this was incinerated, and the quantity of sesqui-oxide obtained was found to be in the proportion of that yielded by the salt when dried in vacuo.

The fact that one of the bases, as well as the acid in this salt is volatile, presents a difficulty in its analysis which is not found in that of tartrate of iron and potassa. While the estimation of the iron is comparatively easy, that of the acid is proportionably difficult. Attempts were made to estimate the quantity of tartaric acid, with the chlorides of calcium and barium, and the bisulphate of potassa, but in each instance, the precipitate obtained did not contain half the acid that theory required; the object was attained, however, by the employment of nitrate of lead.

To 30 grains of tartrate of iron and ammonia in solution, an excess of nitrate of lead was added, the mixture heated, and when cold, the precipitate, washed, dried, and weighed, amounted to 44 grains, and had a yellowish color.

When 30 grains of this precipitate was carefully incinerated, 20 grains of residue was obtained, and the loss (tartaric acid) 10 grains. Consequently, if 30 : 10 :: 44 : 14.66 grains, or the amount of acid in 30 grains of the hydrous salt, by the result of this experiment. Theoretically, as 273 (the equivalent of the hydrous salt) is to 133, (the quantity of acid it contains) as 30 (hydrous salt) is to 14.61, (the quantity of acid it should contain.) Thus it is evident, that the theoretical and practical results are sufficiently near to infer the presence of two atoms

of tartaric acid in one of the salt. It follows, as a consequence, that the remainder unaccounted for, after estimating the water, oxide of iron, and tartaric acid, is ammonia; so that the following statement of the whole result will give the relation between theory and experiment, in 30 grains of the salt.

	Experiment.	Theory.			
Sesqui-oxide of iron	8.70	8.82	= 80.	1	equiv.
Ammonia	1.93	1.86	= 17.	1	"
Tartaric acid	14.66	14.61	= 133.	2	"
Water	4.71	4.71	= 43.	4	"+
	30.00	30.00			

Formula $(Fe^2O^3+\overline{T})+(H^3N+\overline{T})+4HO+$

ART. LVIII.—MEMOIR UPON THE DETECTION OF ARSENIC FORMING A TOXICOLOGICAL COMPENDIUM, AS FAR AS REGARDS THIS SUBSTANCE. By Augustine Duhamel.

Chapter of Contents.

Preliminary observations—Arsenical preparations employed as poisons—Character of arsenious acid—Distinctive characters presenting means of its recognition—Reduction—Manner of proceeding when this substance is made the subject of medico-legal inquiry—Marsh's apparatus, with the modifications and improvements upon it—Figuier's process for separating the organic matters, and isolating the arsenic by an improved and infallible method—Absorption of arsenic by the animal tissues, and its detection after long inhumation—Symptoms which betray the poisonous action of arsenic upon the living economy—Antidote.

The lamentably frequent instances of human destruction by this energetic poison, both in this and other countries, render it obvious to every reflecting mind, that any means which may be used to bring the subject fully under the notice of apothecaries and physicians, should command the deepest at-

tention. The recent case of Madame Laffarge, in Paris, charged with the crime of poisoning her husband, which enlisted in the cause some of the ablest chemists of Europe, and her subsequent conviction, mainly owing to evidence adduced through chemical investigation, serves to illustrate the importance of a familiar acquaintance with this branch of analytic chemistry, and likewise the skill requisite in the management of such nice operations, in order to arrive at unerring conclusions. Though viewed but as an accessory branch of chemistry, it behooves every apothecary to perfect himself in the knowledge of toxicology. Incompetency, in this respect, might lead to the escape of a hardened criminal from merited punishment; or, what is worse, consign an innocent fellow being to an untimely end.

From a general belief that physicians and druggists, by virtue of their vocation are thoroughly versed in all its kindred branches, (as they should be,) they are often required to pronounce upon the exact nature of a substance, used either in medicine or the arts. Among these may be found a few whose scientific attainments, united to practical experience, would justify their being intrusted by a court of justice with any object of chemical investigation, but by far the greatest portion are deficient in the requisite skill, as well as theoretical knowledge. These observations apply with peculiar force in this country, where the whole range of poisons, is accessible to the applicant, and where the want of legislative protection engenders so many self constituted apothecaries and physicians.

To be acquainted with the theory of chemistry only, is not enough. The mere experimenter will be embarrassed in the application of its principles, and in very simple operations connected with the use of re-actives, will fail to establish his convictions as to the nature of the substance under examination.

A great bar to an acquisition of the proper knowledge, is that most, if not all of the treatises, upon toxicological chemistry, are by foreign writers, and some in a foreign language,

and consequently within the reach of very few apothecaries in this country.

Sensible of these deficiencies, and as an apothecary, feeling how likely some of us may, one day or other, be placed in a situation requiring an application of our chemical knowledge in presence of judicial authorities, it occurred to me that a *manual* or *code*, based upon established processes taken from the most authentic sources, would be of immense utility in guiding an operator in his researches. For this purpose I have collected the choicest matter in reference to this subject, contained in the works of Berzelius, Leibig, and Orfila, chemists, whom the scientific world, look up to, as the highest authorities. I have also derived valuable assistance from the use of selections made by M. Lassaigne, and embodied in his very useful work entitled, "Dictionnaire des Reactives," illustrated by diagrams some of which I have transferred to this paper.

Having concluded these incidental remarks I shall now proceed with my labors in the order prescribed.

The form in which arsenic is commonly adminstered as a poison is that of arsenious acid, or *white arsenic,* commonly called *ratsbane.* The sulphurets are sometimes used, being kept in the shops under their common names of Realgar and Orpiment; their employment, however, is rare, on account of the difficulty of disguising their color, and their being poisonous in a far less degree than white arsenic. Of this last it is our main object to speak.

White arsenic, ranked at the present day among the acids, is met with in commerce, in white pieces, opaque at their surfaces, commonly presenting, in their interior, a semi-transparent and vitreous layer. Its specific gravity is 3.7. Exposed to the air it soon loses its primitive transparency and becomes of a milk white color, more friable and according to Guibourt, a little more soluble in water. Its taste is harsh, and slightly acrid, with a sweetish after taste. Heated in open vessels it wholly sublimes in small transparent tetrahedral crystals. Thrown upon burning coals, it volatilizes in white

smoke, with a characteristic alliaceous order. This odor, due to a portion of arsenic reduced by the contact of charcoal, is not manifested when the arsenious acid is placed upon a red hot brick, it then volatilizes without sensible odor. This acid is sparingly soluble in water; hot water dissolves more than cold water; at $+15°$ it dissolves $\frac{96}{10000}$ and at $+100°$ $\frac{968}{10000}$, so that a part of the acid separates in a crystalline form by the cooling of the solution.

Composition.

Arsenic	75.82 or 2 atoms	Its formulæ
Oxygen	24.18 or 3 "	is $\dddot{A}s$
	100.00	

Distinctive Characters.

1st. Reduced to fine powder, and thrown upon glowing charcoal, the arsenious acid is at once disengaged in the form of white vapors of an alliaceous odor, leaving no residue upon the charcoal. If during its volatilization you place within two inches of it a bright plate of copper, the vapors condense upon it, giving a white coating to the metal, but if the plate is held too near the fire, say within a line or two, you obtain a black or grayish coat.

The blackish color developed in the latter case, depends (according to Orfila) upon a portion of metallic arsenic deposited upon it, and which being reduced by contact with the charcoal, condenses upon the plate previous to being burnt by the oxygen of the air. (Jour. de Chimie Med. et de Tox. vol. 5th.)

2d. Dissolved in boiling water, its solution feebly reddens tincture of litmus. Lime-water added in excess occasions a white precipitate of *arsenite of lime*, soluble in an excess of acid; hydosulphuric acid communicates to it a golden yellow color, which a small quantity of ammonia causes to disappear, and which the acids re-establish, forming a flocculent yellow precipitate of sulphuret of arsenic.

If you abandon to itself the solution mixed with hydrosulphuric acid it becomes after sometime turbid, and deposits yel-

low flocks; the addition of a few drops of hydrochloric acid produces this effect instantly and the precipitate formed enjoys the property of re-dissolving in liquid ammonia, and again to be separated by the acids.

3d. Saturated by several drops of alcoholic potash, this solution produces with nitrate of silver a flocculent canary-yellow precipitate, which becomes brown by the action of light, and a fine herb green precipitate (deuto-arsenite of copper) with the deuto-sulphate of copper. With the ammoniacal sulphate of copper, this last effect is produced in a solution of arsenious acid unsaturated by the potash.

4th. By evaporating to dryness, the solution of arsenious acid, saturated by the potash, mixing the residue with a little charcoal, and calcining it by the flame of a spirit lamp, in a small tube drawn out slender at one end as represented in the plate fig. 1, you obtain at a small distance from the heated point a brilliant encrustation of metallic arsenic, which adheres to the sides of the tube, and gives to it the appearance of mirrored glass.

5th. A small quantity of powdered arsenious acid, intimately mixed with a little black flux (a mixture of carbonate of potash and finely divided charcoal, obtained by deflagrating in a crucible heated to redness, 2 parts of cream of tartar and 1 of nitre,) also furnishes a like result upon calcining this mixture in a glass tube drawn out to a point.

6th. Again, the reduction of arsenious acid may be effected upon minimum quantities, according to Berzelius, by the following process: Draw out by means of a spirit lamp, a common tube so as to taper it down to the diameter of a strong knitting needle; then close the narrow extremity several inches distant from the point whence drawn. Introduce a small grain of arsenious acid in the closed end, a, (see fig. 2,) and place over it as far as b, small particles of very dry charcoal; hold the tube horizontally in the flame of a spirit lamp, so as at first to heat only the charcoal, and when this is heated to redness, carry the flame to the extremity of the tube a, where the arsenious acid is contained. This, in volatilizing, is reduced by the contact of the heated charcoal, and condenses at a

little distance front of it in the form of a brilliant metallic ring, and which may be driven further along the tube by the approach of the flame. Cut the tube at the place where the metal is found, then heat, it keeping the nose at some distance above it, and the arsenical odor will be perceived in the most sensible manner. This experiment may be made upon a piece of arsenious acid so small that a piece sufficiently large to be taken from its place and introduced in the tube, will give a decided result. (Berzelius.)

The following table from Lassaigne, displays the sensibility of the reactives employed in these experiments.

Quantity of arsenious acid dissolved in water.	*Hydro-sulpnuric acid.*	*Hydro-sulphate, and acid.*	*Ammoniacal sulphate of copper.*	*Lime water.*	*Barytes water.*
$\frac{1}{2500}$	Yellow.	Pale yellow precipitate.	Herb green precipitate.	Flocculent white precipitate.	None.
$\frac{1}{5000}$	Yellow.	Idem.	Idem.	First nothing, then becomes turbid and precipitates.	None.
$\frac{1}{10000}$	Yellow.	Idem.	Idem but less intense.	None.	None.
$\frac{1}{20000}$	None.	Whitish yellow precipitate.	Pale green precipitate.	None.	None.
$\frac{1}{40000}$	None.	Idem.	Idem.	None.	None.
$\frac{1}{80000}$	None.	None.	Clear green precipitate.	None.	None.
$\frac{1}{160000}$	None.	None.	Very pale green precipitate.	None.	None.

Having concluded with the exposition of the distinctive characters of arsenious acid, we now come to the consideration of this substance under a *medico-legal* head, which embraces the application of the above cited experiments to cases of poisoning by it.

In order to know whether a suspected substance, which has occasioned death, contains any arsenic—

1st. Ascertain if there be any of it left remaining; upon finding which, you submit it first to the action of fire, to destroy organic matters, then dissolve it in boiling water, and test it with chemical reagents, to see if it comports with the character of arsenic.

2d. If what remains should be a liquid, then evaporate a portion of it in a porcelain capsule, and examine the residue, by employing the means for reducing arsenic to the metallic state, which only can be regarded as certain proof.

3d. In case all the poison has been swallowed, you must act upon the matter ejected by vomiting, separating first the fluid parts, by means of a filter, which liquid you test with the reagents. Search among the solid parts for solid, granular particles, which, thrown upon burning charcoal, give out a white smoke with an alliaceous odor. If these experiments furnish no result, it will be necessary to boil a portion of the solid parts with about twelve times its weight of distilled water for fifteen minutes, then filter, and submit the liquid to the tests above indicated.

4th. The matters collected after death, in the stomach and intestines, should be submitted to the same investigations: these may be summed up under these three principal heads: (1.) Search with the naked eye, and afterwards with a lens, to ascertain if there be not some solid particles of arsenious acid in these matters, and, if it be possible, extract them mechanically for particular examination. (2.) If these matters contain no visible particles of arsenic, strain them forcibly through a piece of white linen to separate the liquid portion, which should be filtered and examined with care. (3.) If these trials have not led to the discovery of arsenious acid, treat the ex-

pressed solid matters with about ten times their weight of boiling water, in a porcelain capsule or glass matrass, and after filtering the decoction, you acidulate it with a few drops of hydrochloric acid and bring it in contact with hydrosulphuric acid gas. If the solution contains arsenious acid it becomes colored yellow, and a precipitate of sulphuret of arsenic is formed. In this case it will be useful to prove that this precipitate is occasioned by arsenious acid existing in the solution, as the yellow color of the sulphurets of *selenium, cadmium, tin* and *antimony*, might be mistaken for it. For this purpose, gather the precipitate, dissolve it in water of ammonia, afterwards evaporate the ammoniacal solution, and calcine the residue in a slender tube with a little black flux or potash; the arsenic, separated from its combinations with the sulphur, volatilizes, and will be easily distinguished by its brilliant metallic aspect, and the alliaceous odor which it gives out by contact with incandescent charcoal.

Berzelius has pointed out another process, different from this, and which he considers an excellent method for proving the existence of arsenic in *medico-legal* cases. It is a modification of one proposed by Valentine Rose. It is as follows:

Boil the contents of the stomach, and its membranes cut into pieces, with several drachms of caustic potash, to dissolve all the arsenic: supersaturate the liquid with hydrochloric acid, filter, and pass through it a current of hydrosulphuric acid gas. If it contains any arsenic, it becomes, after a short time, yellow, and then a precipitate of sulphuret of arsenic takes place in the form of a yellow powder. If the quantity of arsenic is very feeble, the liquid becomes yellow without the formation of a precipitate, but by evaporation the sulphuret of arsenic is deposited in proportion as the acid is concentrated by the evaporation. (The mere yellow color of the liquid should not be considered as a proof of the existence of arsenic, as this tint is likewise produced by the nitric acid, which, being reduced to nitrous acid, colors yellow the dissolved animal matters.) Pass the solution through a small filter, and wash the sulphuret of arsenic. If it is in so small a

quantity as not to be separated from the filter, then take it up by means of caustic ammonia, which you afterwards evaporate in a watch glass; the sulphuret which remains may be detached from the glass and collected. You then transform it to arsenic acid; for this purpose, throw it by little at a time upon nitre in a state of fusion, and contained in a glass tube closed at one end. The sulphuret of arsenic oxydizes with a slight effervescence and without deflagaration; then dissolve the salt which remains in a few drops or least possible quantity of water, add to the liquid an excess of lime water, and boil it, to collect together the arseniate of lime. Expose this salt to a moderate red heat, mix it with recently burned charcoal, and introduce the mixture into a glass tube, narrowed towards one extremity and terminated by a hollow ball, (see fig. 3,) into which the mixture is received.

Commence by heating the tube to drive out any moisture. Then expose the part A to the flame of a blowpipe, until the glass begins to melt. The arsenic is then reduced and collects in the narrow part of the tube, where it spreads over a surface so small that the minutest quantities may be recognised. One-tenth of a grain of sulphuret of arsenic is sufficient to give a decided reaction.

In such delicate experiments as are required in the detection of arsenic, where even traces should not escape observation, you must be certain that the reactives employed are in no wise contaminated with arsenic. For instance, it might happen that the hydrochloric acid contains some, for the reason that sulphuric acid is often made from pyrites or arseniuretted sulphur, and in this case the arsenic passes along with the hydrochloric acid during its preparation. For this reason, you must first convince yourself that your sulphuric acid, for disengaging the sulphuretted hydrogen, and the hydrochloric acid, are free from arsenic, which may be done by passing over them a current of sulphuretted hydrogen.

Where the poison has been produced by arsenic acid, sulphuretted hydrogen reacts with difficulty, and in a less decided manner. In this case you must supersaturate your acid

liquid with hydrosulphate of ammonia, then heat it gently for an hour, and precipitate with hydrochloric acid. The precipitate, which in all likelihood may be nothing more than sulphur, is treated as has just been directed. If it contains no arsenic, lime water will produce no precipitate. (Berzelius.)

While one or two of these experiments, by their results, may tend to confirm suspicion as to the presence of arsenic—the concurrent testimony of the whole is necessary to form a proper conviction in the mind of the operator.

The ordinary tests of ammoniacal nitrate of silver, and ammoniacal sulphate of copper, give uncertain results. Phosphoric acid, for instance, precipitates nitrate of silver yellow, like arsenious acid, and decoctions of onion, and unburnt coffee, when mixed with pôtash, form with salts of copper green precipitates, which resemble Scheele's green.

The reduction alone may be regarded as positive proof, and renders the others superfluous ; when this does not succeed, the result is always doubtful. An operator, not much accustomed to these operations, may often imagine he perceives the smell of arsenic in the odor of animal matters and yet be mistaken. Upon this subject it is well to repeat, that no physician or chemist should give testimony in court regarding the detection of arsenic, unless he has himself assisted in the investigation, or been a witness to the examination conducted under skilful hands, and who have affixed their signatures and seals to the vessels containing the mixture.

The processes thus far detailed for testing arsenic, though good in themselves, have in a great measure given way to a more recent one, for which we are indebted to the ingenuity of Mr. James Marsh. It consists in the application of hydrogen gas, and possesses the advantage of simplicity, in separating minute portions of arsenic from organic substances, by a prompt and convenient method.

It is founded upon the property which hydrogen, in a nascent state, possesses, of reducing arsenious and arsenic acids, and forming, with their metallic radical, arseniuretted hydrogen gas, which separates spontaneously, by reason of its elas-

ticity, from the liquid in which it is produced, and may be collected in an ordinary gas recipient for future examination. It presents the means of obtaining in a direct manner, small quantities of arsenic from viscous alimentary liquids, such as gruel, soup, porter, coffee, wine, &c.

This apparatus, as represented in fig. 4, consists of a glass tube open at both ends, and about $\frac{3}{4}$ths of an inch in its internal diameter. It is bent in the form of a syphon, the shorter leg being about five, and the longer eight inches in length. A stopcock, ending in a jet of fine bore, passes tightly through a hole made in a sound cork, which fits air tight in the opening of the shorter branch. Lastly, the apparatus is placed in an upright position, and braced to a wooden support.

A bit of glass rod, A, about an inch long, is dropped into the shorter leg, followed by a piece of pure sheet zinc, B, bent double, or coiled so that it runs down the tube till it is stopped by the piece of glass rod first put in.

When you wish to experiment upon a suspected liquid, mix it with a certain quantity of distilled sulphuric acid, (one part acid to seven of liquid,) and pour it into the long branch of the apparatus, until it stands in the short one about $\frac{1}{4}$th of an inch below the cock kept open. Bubbles of gas will be seen to rise from the zinc, which are pure hydrogen if no arsenic be present, but if the liquid holds arsenic in any form in solution, the gas will be arseniuretted hydrogen. Allow the first portions to escape, in order to drive out the atmospheric air, then close the cock, and the gas will collect in the shorter leg and drive the fluid up the longer one till the liquid has descended in the short leg below the piece of zinc, when no more gas is produced, as in the case of the hydrogen gas lamps.

Upon quickly igniting the gas as it issues from the jet, and then holding horizontally in contact with the flame a plate of glass or porcelain saucer, the arsenic will be found deposited upon these cold bodies in the form of round spots of a grayish black color and metallic lustre. If no arsenic be present, then

the flame as it burns has a different appearance; the flame is yellowish, transparent and deposits only water.

Should you wish to obtain the arsenic in the form of arsenious acid, then take a glass tube from ¼ to ½ an inch in diameter, or according to the size of the jet of flame, and eight or ten inches in length, and hold it vertically over the burning jet of gas in such a manner that the gas may undergo perfect combustion, and the arsenic combined with it becomes sufficiently oxidized; the tube will thus, with proper care, become lined with arsenious acid, in proportion to the quantity originally contained in the mixture.

When the glass tube is held at an angle of about 45 degrees over the jet of flame, *three very good indications of the presence of arsenic may be obtained at one operation*, viz.: metallic arsenic will be found deposited in the tube at the part nearest where the flame impinges, arsenious acid or white arsenic at a short distance from it, and the garlic smell can be readily detected at either end of the tube. (Marsh.)

These indications of arsenic are manifested as long as the process is continued, or the supply of gas kept up.

It is asserted that $\frac{1}{700000}$ of arsenious acid in solution is manifested in a short time by this process.

Marsh says, that with his apparatus he has obtained distinct metallic crusts when operating on as small a quantity as one drop of Fowler's solution, which contains only $\frac{1}{120}$th, of a grain. The presence of arsenic in artificial orpiment and realgar, in Scheele's green, and in the sulphuret of antimony, may be readily shown by this process when not more than ½ grain of these compounds is employed.

In cases where the above described apparatus cannot be easily procured, its place may be supplied by simpler means. Take a wide mouth vial, fitted with a perforated cork, through which a tube drawn at one end to a fine point passes. (See fig. 5th.)

By putting the liquid you wish to examine, into this vial together with zinc and sulphuric acid, and covering the whole with a layer of sweet oil, about two lines in thickness, to

prevent the frothy effervescence choking the tube, the same results may be obtained as with the other apparatus.

Marsh directs that the matter to be submitted to examination, if not in the fluid state, such as pastry, pudding, or bread, be boiled with two or three ounces of pure water for a sufficient length of time, and then thrown upon a filter to separate the more solid parts. Thick soup and the contents of the stomach to be also diluted with water and filtered, but tea, coffee, cocoa, &c., water, gruel, wine, spirits or malt liquors, can be operated upon without any previous process.

A modification of Marsh's apparatus has been proposed by Orfila, consisting of an ordinary vial, closed by a cork pierced with two holes, which give passage, the one to a straight tube of a foot long which plunges into the liquid, the other to a tube bent at right angles, with one extremity a short distance below the cork, while the other is drawn out to a fine point whence the gas issues. (See fig. 6th.)

To avoid the frothy effervescence which pushes a portion of the liquid out of the apparatus, and prevents the hydrogen gas from burning, and to dispense with the use of oil, which has been indicated in this circumstance Mr. Orfila, has entertained the happy idea of destroying the organic matter by burning it with nitrate of potash, and thus rendering the extraction of the arsenic more easy.

His new disposition of the apparatus permits the introduction of the suspected liquid into the vial without uncorking it.

The test with hydrogen is, however, not infallible. More recent experiments made by Thompson with Marsh's apparatus, prove that antimony treated under the same circumstances, produce black metallic crusts upon porcelain. These stains, which at first sight might be confounded with those caused by arsenical preparations, are thus distinguished.

1st. They only volatilize in part when exposed to a flame of pure hydrogen gas.

2d. Heated with nitric acid they are transformed into antimonious acid which undergoes no change by nitrate of silver in solution, whilst the spots of arsenious acid produce arsenic acid by this re-active, giving a precipitate of a brick red color.

In the October number of the "Journal de Pharmacie," for the year 1840, is a paper by M. L. Figuier, upon the detection of arsenic, in which the inconveniences of the Marsh apparatus are pointed out, and an important improvement recommended which removes all doubt as to the result.

These inconveniences (alluding to the modified apparatus of Marsh, and more commonly employed—a simple bottle—mounted with a tube,) are summed up under the following heads.

1st. The mixture of hydrogen and atmospheric air in the vessel forms detonating gas. In executing a toxicological experiment you incur the danger of an explosion if you light the gas too quick, with consequent breakage of the vessel and a loss of liquid probably irreparable; or to obviate this, you allow the gas as it disengages to escape for some time in order that the common air may be driven out, by which means you lose a certain quantity of arsenic, which, however small it may be, should not be viewed with indifference, when we consider the very small quantity generally contained in these experimental liquids.

2d. A more serious inconvenience, not easily overcome, consists in the frothy development which, when it occurs, renders further operation very difficult.

3d. The manner of inflaming the arseniuretted hydrogen as it escapes from the tube, and receiving the reduced metal upon a cold body, is liable to this disavantage. The flame of hydrogen gas applied to spots of metallic arsenic already formed, volatilizes the metal, when the volume of flame is large and the orifice of the tube irregular. On the other hand it has been observed by experiment that a solution containing but a minute portion of arsenious acid does not show any stains upon porcelain, if the flame has but a very feeble intensity.

For the above given reasons, Mr. Figuier considers Marsh's apparatus susceptible of improvement.

Messrs. Liebig and Berzelius, acting under this belief, proposed to reduce the arsenic by applying heat to a part of the tube. Mr. Chevallier, adopting this modification, recommend-

ed a further improvement by the introduction into the tube of disengagement, of fragments of porcelain, with the double object of multiplying the heated surfaces offered to the passage of the gas, and to effect the separation of antimony from the arsenic, sometimes accidentally mixed with it. By decomposing a mixture of arseniuretted hydrogen and antimony, the arsenic condenses in the cool part of the tube, and the antimony deposits upon the heated pieces of porcelain. This mixture, however, rarely occurs.

Mr. Figuier not being able to find in any of the methods yet proposed one which he could adopt with perfect confidence, for the detection of arsenic in organic matter, ventures to supply the deficiency by giving a process which, he says, *reunites all the conditions necessary to complete success.* He, however, enjoins upon the experimenter the precaution to have perfectly pure re-actives, (free from arsenic.)

Description of Figuier's process.

The suspected matters, as usual, are cut up in pieces.

Introduce them into a glass matrass and cover them over with a convenient quantity of water. The matrass is placed upon a sand bath, the water carried to ebullition and sustained for four or five hours, keeping up a very feeble alkaline reaction. When the decoction is cold, the fat swims, congeals and separates: then filter: a reddish viscous liquid is collected, which passes slowly through paper.

Evaporate the filtered liquid to dryness, first acidulating it slightly with hydrochloric acid, and let the residue be dried without carbonizing the substance. Then redissolve the animal extract in hot water and filter it. The brown liquid which passes is then submitted to a current of washed chlorine, until it ceases to be turbid under the influence of the current of gas, an operation which requires some time. The pale yellow precipitate which is abundantly produced, being separated by filtration, a tolerably fluid yellow liquor is obtained, which contains but a very small quantity of organic matter, rendering further operation easy from the absence of the frothy development. As the liquid contains some chlo-

rine which would decompose the nascent arseniuretted hydrogen, it must be placed in a porcelain capsule and heated to ebullition to drive off the chlorine. The liquid is now fit to be introduced into the apparatus.

The apparatus, which is a modification of that of Marsh, is similar to that represented in fig. 6th, and very much the same as is used in the laboratory of the School of Pharmacy of Montpellier, by Messrs. Balard and others engaged in toxicological analyses.

It consists of as traight necked bottle, holding about ¾ths of a quart, and fitted with a cork traversed by two tubes. The one surmounted by a funnel reaches to the bottom of the liquid contained in the bottle, the other is a bent tube of about 7 or 8 millimetres (3 lines) in diameter, and finely drawn out at its extremity. A convenient way of forming this tube is to make it of two others. One of common diameter connected with the cork and bent, the other of the diameter indicated, to contain the chloride of calcium and porcelain. They may be connected by sheet caoutchouc.

Place in the horizontal tube, first, some pieces of fused chloride of calcium, and afterwards some fragments of porcelain, and afterwards apply heat to this part of the tube.

For this purpose, arrange a small grate, about four inches lengthwise and two in breadth, formed of three rectangular plates of sheet iron, of which the inferior one should be pierced with holes to give passage to the air, and should also support the tube to be heated. Two bricks placed under this will give it the proper elevation. (See fig. 7.)

As the tubes are unable to support a red heat without melting, choose for the tube, glass as little fusible as possible, wrap around the part exposed to the fire a sheet of scraped copper, and fasten this with copper wire.

The tube, thus protected, can neither be deformed or obstructed by fusion.

Commence now, by pouring through the straight tube into the bottle, containing about twelve drachms of zinc, some sulphuric acid, diluted with seven times its weight of water. The

hydrogen forms, and as it disengages, soon drives out all the atmospheric air. Allow the gas to escape for some time, to remove all chance of an explosion, then heat the tube to redness, by placing burning charcoal in the grate. You now introduce the decoction, previously treated as above directed. The froth that may arise, in the course of the operation, can never become troublesome. Should this, however, occur, you can make it descend by pouring a small quantity of alcohol into the straight tube.

However little the liquid under examination may contain arsenic, it soon manifests itself at a short distance from the heated portion of the tube, in the slender part, where a small shining circle of metallic arsenic goes on increasing during the operation. When you perceive that the metallic zone does not grow any bigger, then arrest the operation, which may be maintained one or two hours, taking care that all the zinc employed should be as much as possible dissolved. When the tube is cold, you may separate it from the rest of the apparatus, and assure yourself of the volatibility of the metal obtained, and test some of its properties without altering its metallic aspect. Lastly, close the two extremities of the tube by means of a lamp, and preserve it for the purpose of conviction in a court of justice.

In a new memoir read before the Royal Academy of Medicine, January, 1839, Mr. Orfila has shown, by a series of experiments repeated in cases of poisoning by arsenic, that this acid, introduced into the stomach or applied upon the cellular tissue of living dogs, is absorbed, and mixes with the blood, and is carried into all the organs of the economy.

That it is to this absorption of the poison, that death, which follows, must be attributed.

And that it is possible, with the aid of certain chemical processes, to separate metallic arsenic from the portion of arsenious acid absorbed, even when no traces of this acid have been discovered in the matters proceeding from the stomach and intestines of the person poisoned.

Mr. Orfila establishes, that arsenic may be detected *in ex-*

treme cases in poisoned animals, by acting upon a certain number of muscles, or one of the viscera of the animal economy, previously dried, especially when these viscera are very vascular: but it is preferable to act upon the entire corpse, or half of it at least, as the proportion of acid absorbed is very small. He says it may likewise be detected in the blood extracted by bleeding, when it amounts to several ounces in quantity.

In reference to the detection of arsenic in bodies, exhumed a long time after death by this poison, M. Orfila says:

That it is possible to prove the presence of arsenious acid, mixed with animal matters, even after the lapse of several years.

That if the arsenious acid has been employed in a solid state, it is possible to perceive, after long inhumation, here and there particles, which, being detached with the point of a penknife, presents all the characters of this poison.*

He says that there is no doubt but that arsenious acid, after some length of time, is transformed into arsenite of ammonia, more soluble in proportion as the animal substances produce the ammonia; so that after the lapse of several years it might be difficult to detect the presence of arsenic, from its forming a soluble compound with the ammonia, and filtering into the earth, during an advanced state of putrefaction of the body.

M. Orfila has himself proved, by experiment, that it is possible to find again this acid in the remains of a corpse, after seven years inhumation. (Jour. de Chimie Med. vol. vi.)

It is of the highest importance for every one to know what are the phenomena which give rise to the suspicion of poisoning by arsenic, and the proper means to employ as an antidote. The symptoms, occasioned by a large dose of arsenic, commence about a quarter of an hour after the poison has been taken. The patient at first experiences pains of the stomach, accompanied with anxiety, then a burning heat of the stomach

* And to be convinced that these grains are really arsenious acid, no means offer of conducing to more certain results, or of easier execution, than their reduction to the metallic state.

and intestines, with inextinguishable thirst: after this comes, alternately, vomitings, frightful colics, and sometimes a violent diarrhœa, in which the rectum loses its internal coat and becomes ulcerated: cold sweats, syncope, severe spasm of the arms and legs, loss of the senses, convulsions, and finally death. This horrible condition may be prolonged from five to ten hours, and often beyond that. After this the body becomes much swollen, and in the case of a plethoric person in the hot season, it promptly enters into putrefaction, in which, however, the arsenic has no direct agency. Upon the opening of the body, the internal membrane of the stomach is found marked with ecchymosis, and here and there corroded, and destroyed. Still, it is not without example, that poisoning by arsenic has taken place without any apparent inflammatory symptoms. The vessels of the brain are gorged with blood, and frequently ruptured, exhibiting the same phenomena as in the case of apoplexy, except in a higher degree.—(Berzelius.)

The most effectual antidote to the poisonous effects of arsenic is the *hydrated peroxide of iron*, for which we are indebted to the recent discovery of a German physician. (For a description of its method of preparation see American Journal of Pharmacy, vol. vi.—new series.)

This antidote must be administered as soon as possible, after the discovery that arsenic has been taken, and as it produces no bad effects itself, should be given every five or ten minutes, until entire relief is obtained.

It is given in a semi-liquid state, in the dose of a table-spoonful to grown persons, and less to children.

ART. LIX.—INTRODUCTORY LECTURE TO THE COURSE OF MATERIA MEDICA IN THE UNIVERSITY OF PENNSYLVANIA. By Geo. B. Wood, M. D.

Delivered November 3, 1840.

Allow me, gentlemen, before proceeding to the peculiar duties of the occasion, to greet heartily my old friends among you, and to those who are here for the first time to proffer my kindest regards, while I ask for theirs in return. It is always my anxious desire, when entering with the class upon our mutual labors for the winter, that we should go hand in hand together. Not only is the way thus rendered more agreeable both to teacher and pupil; but they are also enabled to advance more rapidly; as the intellect always operates with greater efficiency when aided by the affections. That head must be empty indeed which the heart cannot stimulate into action. The consciousness that he possesses the good will of his class is to the lecturer one of the most powerful incentives to exertion; and instruction seldom fails to sink deeply into the learner, when he feels that it proceeds as much from interest in his welfare as from a sense of duty. Let us, therefore, gentlemen, set out as friends upon our contemplated journey. You will find me disposed to do everything, during its course, which will contribute to leave us friends at the end of it.

I have selected, as the subject of this Introductory Discourse, the History of the Materia Medica in the United States. In this choice, I do not wish to be considered as actuated by any narrow preference of the discoveries or improvements made in our own country over those of foreign origin. Our patriotic partialities have been appealed to in favor of American medicine in contradistinction to that of the old continent. But this is folly, or something worse. Medicine is a science, and science is truth brought to light. Now truth is one everywhere. She is of no place or country.

Wherever she may be brought forth, from the moment of her birth she belongs equally to the whole world. She brooks no individual nor national fetters; but is the common friend and servant of mankind. To speak of an American truth would be absurd. Would it be less so to speak of American medicine as something distinct from the general science? But, though it becomes us to throw aside that impolitic self-conceit of patriotism which undervalues whatever comes from abroad, and stigmatizes with the ancient Greeks and modern Chinese everything foreign as barbarous, we may justly and profitably endeavor to estimate the amount of truth which our country has contributed to the general mass, and thereby stimulate a generous emulation to augmented efforts, either to supply deficiency, or to achieve or maintain an honorable precedence in the race of improvement. This is all that I propose in calling your attention to the Materia Medica of the United States.

In treating of this subject, I propose, *first*, to give a general view of the medicines which our country has furnished to the world, and of the resources she contains within herself; *secondly*, to speak of the condition of this department of medical science, and of the individuals who have contributed to its promotion within our limits; and *thirdly*, to offer you some inducements to exertion in the further development of our yet hidden or but partially discovered treasures.

If we extend our view to the whole American continent, we have to boast, on this side of the Atlantic, of medicinal resources inferior probably to those of no other section of the globe. Not to mention numerous substances of little importance, we have in the Peruvian Bark the most valuable of all tonic medicines; scarcely indeed surpassed in efficiency and extent of application by any other article of the Materia Medica; in the Quassia of Surinam and the West Indies, the strongest of the pure vegetable bitters; in the Rhatany of Peru, one of the most efficient astringents; in the Ipecacuanha of Brazil, the best of all vegetable emetics; in the Jalap of Mexico, the best vegetable hydragogue cathartic; in the Bal-

sam of Tolu, a good stimulant expectorant; and finally, in Copaiba, and Guaiacum, and Sarsaparilla, medicines of peculiar and valuable properties, such as could not well be dispensed with in the practice of our art, and could not be replaced elsewhere. But none of these substances are found in the United States, at least none of them are furnished to commerce by the soil of our country.

It is indeed singular, considering the extent of our territory, the diversity of its climate, and the vast number of its vegetable productions, that so few medicines from this source have been admitted into the European catalogues of Materia Medica, or even come into general use among our own practitioners. When I have mentioned Lobelia, Sassafras, Seneka, Serpentaria, Spigelia, Toxicodendron or Poison Oak, and Canada Turpentine, I should be at a loss to add the name of another medicine, procured exclusively from the territory of the United States, or to the north of it, which has been introduced to any considerable extent into European practice. It is true that there are several medicinal plants common to North America and the old continent; such as the Bittersweet, Dandelion, Hop, Iceland Moss, Juniper, Pipsissewa, Thorn-apple, and Uva Ursi. But, even with this addition, the catalogue of our indigenous medicines recognised abroad is very meagre; and it is a question of some interest, how it happens that so great a disproportion exists between the extent of our country and its contributions to the general Materia Medica. It is not that our native resources in this respect are peculiarly deficient. On the contrary, as I shall soon have occasion to show, the United States are rich in indigenous medicinal products. But there is a coincidence in properties, real or supposed, between the old standard medicines and many of those of native origin, which has caused them to be applied to the same states of disease; so that the substitution of the latter for the former could afford no advantage sufficient to overbalance the influence of habit in practitioners, their natural want of confidence in untried means, and the various facilities for prescription with which a regular supply of the drug through

established commercial routes, and long settled modes of pharmaceutical management, supplied them. Labor, moreover, is in this country too costly to compete with that which furnishes most of the foreign drugs. We wield the various means of profit on too large a scale, and are too much accustomed to the floods of grain which pour in from vast fields of labor and enterprise, to pay any regard to those dribblets that accrue from the collection of barks and roots. Hence the supply of our indigenous medicines is not such as to enable them upon considerations of economy, to displace those already in use of equal or better understood virtues ; and the consequence is that the general demand for them is confined to substances of peculiar properties, such as could not be elsewhere procured. The influence of our national habits of labor upon the commercial value of drugs, is strikingly illustrated in the very great increase in price of Spigelia or Pink-root, since the emigration of the Cherokee Indians, by whom chiefly it was in former times collected and sent to market.

I have said that the United States are rich in medicinal products. This will be rendered obvious by running the eye over a list of the more important indigenous medicines, classified according to their effects upon the system. Under the head of astringents, we shall find the bark of different species of Oak ; the roots of the Blackberry, Dewberry, Geranium maculatum, and Heuchera Americana, or alum-root ; and the leaves of the Pipsissewa and Uva Ursi. Among these are medicines capable of being employed for any object attainable by means of the class to which they belong, at least of the portion of it derived from the vegetable kingdom. In tonics our country is very rich. It is true that we have no Cinchona ; but in the barks of the different species of Cornus or dogwood we have remedies closely analogous, though inferior to it in virtues. Of the simple bitters, the Sabbatia, Coptis, and Xanthorriza might be substituted for Gentian, Quassia, and Columbo. The union of various important properties with the purely tonic, as those of a stimulant in Serpentaria, of a narcotic in Hops, of a sedative in Wild-cherry bark, of a diaphoretic and

emetic in Boneset, renders these medicines of great value; and those of them not hitherto introduced into the Universal Materia Medica highly deserve to be so. I consider the Wild-cherry bark as among the most efficient remedies in the tuberculous diathesis, and not inferior to any other medicine in the treatment of consumption itself. Our catalogue of aromatics is also copious, including, among others, Angelica, Calamus, Sassafras, Hedeoma or Pennyroyal, Common marjoram, Partridge-berry, and Spice-wood or Laurus benzoin. Of stimulants we have Turpentine and its volatile oil; of narcotics, Stramonium and Dulcamara; of antispasmodics, Dracontium and Cimicifuga. Our emetics, if we leave ipecacuanha out of the question, are inferior to those of no other country. Lobelia, though so much much abused by empirics, is possessed of highly valuable properties; Gillenia is supposed to resemble the famous Brazilian root in its action; and Sanguinaria conjoins with its emetic properties others of a peculiar nature, which are said to render it especially useful in certain forms of disease. Among the cathartics, we have substitutes for several of those imported, as in Cassia Marilandica for Senna, in the Extract of Butternut for Rhubarb, and in Podophyllum for Jalap. We are not wanting in diaphoretics or diuretics, and as an expectorant our Seneka holds, in my estimation, the very highest rank. As epispastics we have several species of Cantharis not inferior in virtues to the Spanish fly, and the Cantharis Nuttalli, of the far west, will probably some time come into extensive use; as it is said to be abundant, and has the advantage of equalling if it does not exceed the foreign insect in magnitude. Our native Turpentine and its volatile oil, together with the Hemlock pitch, are good rubefacients; Slippery-elm bark is an excellent demulcent and emollient; and perhaps in no part of the world are there vegetable anthelmintics more efficacious than Spigelia and Chenopodium. In this enumeration I have not attempted to exhaust the whole catalogue of native medicines. My object was only to show that our resources are ample, by calling attention to a few of the more prominent substances, the virtues of which are

known. Besides those mentioned, there are many others which have been more or less investigated, and I have no doubt that some yet lie buried in the mass of our luxuriant vegetation, which will one day be brought to light, to the honor of their discoverers, and the benefit of mankind.

More than fifty years ago, the opinion was advanced by Shoepf that, relying upon their native resources, the Americans might dispense with the greater part if not the whole of the imported medicines. Even at the present time, however, with all the improvement which half a century has conferred upon our indigenous Materia Medica, I cannot coincide wholly in this sentiment. The present standard remedies are for the most part those which have stood the test of ages. They have been gathered from all quarters of the globe, have gone through every variety of trial, and have been sifted out from an immense mass of materials which had been for thousands of years in the course of accumulation. Happy the country which can boast itself the source of one of the more important of these remedies! It will hold a place in the memory of mankind so long as human infirmity shall exist, and, even with no other claims upon our sympathies, will rank among the valued spots of the earth, when countries which derive their importance from mere temporary causes shall have been forgotten. The whole human family will ever look to the Andes with interest and gratitude as the source of Peruvian bark, even though the political clouds which now overshadow her shall deepen into tenfold darkness, and her moral culture become as desolate as her own icy summits. It is not in the order of Providence to lavish on any one region a wealth equal to that scattered over the whole world beside. Not even the microscopic eye of patriotism could magnify our medicinal riches into competition with those of the entire globe. They are, however, very ample: and should political accident ever cut off our supply of drugs from abroad, though we should certainly feel the want of them severely, we should nevertheless be able, in the products of our own soil, to find partial substitutes for almost all that we had lost. It becomes us most care-

fully to cultivate our resources, both that we may be fully prepared against whatever adverse events may occur, and in the hope, moreover, that we may thereby add something new and valuable to the means already existing for the alleviation of human evil.

It is an interesting subject of inquiry, in what manner attention was first attracted to the medicinal plants of this country. When our ancestors had established themselves in their new home, and began to investigate with the eye of curiosity or interest the various novelties around them, it was quite natural that they should at once be struck with resemblances to familiar objects, and should expect a similarity in properties where they found a similarity in appearance. The care of their health no doubt early directed their inquiries towards medicinal products, and plants resembling the simples with which they had been familiar received corresponding names and similar applications. Thus we have our Centaury, our Dittany, our Hellebore, our Pennyroyal, our Senna, our Wormseed, and numerous others so closely allied to the European plants by botanical affinities as to be entitled to the same generic designation, such as the Elder, the Elm, the Oak, the Pine, and the Willow. In this way a domestic Materia Medica was immediately commenced, which gradually increased as substances before unknown were accidentally, or from the possession of certain striking sensible properties, submitted to trial, and found or imagined to operate usefully as medicines. Several substances were also derived from the aborigines, of which the most important are Seneka, Serpentaria, and Spigelia.

It was at one time a general belief that the Indians were in possession of many valuable remedies, and had even specifics for various obstinate complaints which had baffled European skill. These they were supposed to keep secret from some mysterious cause, which acted powerfully on the popular faith by exciting the imagination. A class of empirics took advantage of this superstition, and, under the name of Indian Doctors, spread themselves over the country, imposing their nos-

trums upon the public credulity as secrets obtained from the aborigines, and decrying, with all the zeal of the Thomsonians who have succeeded them, the poisonous minerals employed by the regular practitioners. But faith in the superior medical knowledge of our savage tribes is disappearing with the tribes themselves. The simple truth seems to be, that many of the indigenous medical plants were known and employed, though very unskilfully, by the Indians, who communicated all they knew to the Europeans upon their settlement in the country. Whatever mystery may have, in some instances, been thrown over the subject, was a contrivance of imposture to conceal its real ignorance, or to magnify, through the effect of partial obscurity, its little grain of knowledge into something worthy of notice.

The wants of the country during the war of Independence, when the supply of drugs as well as other necessaries from abroad was very much impeded, stimulated attention to our indigenous resources, and led, if not to the discovery, at least to a fuller investigation and more extensive use of various native medicines.

Another circumstance which contributed very considerably to the cultivation of our native Materia Medica was the regulation formerly existing in this school, which required the publication of the inaugural dissertations of the graduates. A laudable regard to their reputation stimulated the exertions of the candidates, many of whom were induced to extend their researches into the yet but very partially explored region of our native medicines, and were rewarded by discoveries either of new substances, or of new and valuable properties in those already known.

It is due to those who have contributed to bring a fresh soil of knowledge into cultivation, that their names and services should from time to time be revived in the memory of their successors, who are enjoying the fruits of their labors. It is, besides, a healthy excitant of our own exertions, thus to have placed before us the example of useful effort and its just re-

ward of commendation. An account, therefore, of the earlier cultivators of our indigenous Materia Medica may be justly expected from a teacher of that science, addressing those who are to be at once the depositaries of the reputation of their predecessors, and claimants of a like office from posterity towards themselves. I wish to make the proposed sketch as full as the occasion will permit; but it will be necessarily inadequate, and should be filled up by your own further research.

The earliest notices which I have been able to discover of North America medicinal plants are those contained in the Flora Virginica of Dr. John Clayton, published at Leyden by Gronovius in 1739. Dr. Clayton was a native of England, but emigrated early in life to Virginia, where he became eminent as a naturalist and physician, and died in 1773 at the very advanced age of 88 years. Dr. Thatcher states that he published, in the Philosophical Transactions, an ample account of the medicinal plants which he had discovered. It is his name, I presume, that has been enshrined in the botanical designation of that beautiful little spring flower—the *Claytonia Virginica.*

In the years 1743 and 1744 similar medico-botanical notices of plants growing in the province of New York were published in the Upsal Transactions by Dr. Cadwallader Colden, a gentleman of considerable scientific and political distinction, who came from Great Britain to this country about the year 1710, and established himself in that province.

But, perhaps, the most ample of these earlier contributions was that by John Bartram, a native, I believe, of Pennsylvania, who was distinguished as an indefatigable cultivator of botany, and is very favorably remembered in this city as the founder of the Botanical Garden upon the Schuylkill, which has always gone by his name, and is still in the hands of one of his descendants. His essay, containing a description of several medicinal plants of North America, was printed in the year 1756, in the Amœnitates Academicæ of Linnæus, as a portion of a paper denominated *Specifica Canadensium,* pre-

pared by John Von Cölln, and intended to embrace what was at that time known in relation to the Materia Medica of this country.

In subsequent years, various additions were incidentally made to the store of knowledge by writers upon other subjects, as by Catesby in his Natural History of Carolina, and by Kalm, a Swedish gentleman, who travelled in North America about the middle of the last century, and published an Itinerary on his return to Europe.

The first work devoted expressly to the Materia Medica of North America was that of Dr. Shoepf, a German physician, who came with the Hessian troops to this country during the revolutionary war, and remained for some years after its termination, travelling through the different States, and giving an especial attention to the study of plants. After returning to Europe, he published, at Erlangen, in Germany, a treatise in the Latin language, under the title of *Materia Medica Americana*, describing with scientific brevity a great number of our indigenous and naturalized plants, with the shortest possible account of their sensible properties, effects on the system, and medical uses. His work, however, can be of little use to the practitioner; for, though he has introduced everything into it with an indiscriminating appetite, his practical remarks are exceedingly vague, meagre, and unsatisfactory, and even the dose and proper mode of administration are, for the most part, withheld.

A much more valuable practical essay was that of Doctor Benjamin Smith Barton, formerly Professor of Materia Medica, and subsequently of the Pratice of Medicine in this University, whose various knowledge, zeal in the prosecution of natural history, and talents as a medical teacher are still fresh in the recollection of the profession. No one man in the United States, I presume, has contributed so much to the improvement of our native Materia Medica. Not only did he diffuse by his writings and lectures the knowledge which he had accumulated by diligent research, but he breathed a spirit of investigation into the young men who heard him that pro-

duced a rich result of discovery. The work referred to lays no claim to the consideration of a regular treatise, being modestly entitled "Collections for an Essay towards the Materia Medica of the United States," and consisting of materials partly gathered from previous writers, partly accruing from his own inquiries and observation, and thrown together without any great attempt at elaboration. His aim appears to have been to collect into a single repository, of convenient access, facts which might otherwise have been lost, or, from their scattered condition, have remained inaccessible to ordinary research. His book has been a store house of materials for subsequent authors, and will probably continue to be at the fountain head of inquiry; as it contains all that an investigation pushed into the times beyond it would be likely to discover. It consists of two parts, the first of which was published in 1798, and afterwards with some additions in 1801, while the second part did not make its appearance till 1804.

It would be impossible for me, consistently with my present design, to mention individually the numerous inaugural essays and monographs published in the Journals, in relation to particular indigenous medicines. Many of these have considerable merit, and some have been the means of introducing to general notice valuable remedies which have since retained a place in the public esteem. It was soon after the appearance of Dr. Barton's *Collections*, that the attention of students of medicine appears to have been most strongly directed into this channel; for in the year 1802, not less than six Theses on the subject of our medicinal plants were published by alumni of this school, and that out of a class of graduates not exceeding twenty in number.

I do not know that it is strictly in keeping with the plan of this lecture to call attention particularly to the botanical works which appeared about this time and subsequently, and which, though they did not make the medicinal virtues of plants an especial object, nevertheless contain scattered notices in relation to them, of some value to the physician and medical writer. It may, perhaps, be sufficient to mention the

North American Flora of the elder Michaux, which was printed at Paris in 1803, and that of Frederic Pursh, who, after having been diligently engaged for more than twelve years in exploring the botany of this country, either by personal examination of the plants in their localities, or by means of the herbariums of others, published at London, in 1814, his very valuable work.

There is another author whom it would not be just to pass over, without some allusion to his merits in connexion with our subject. I refer to the younger Michaux, whose treatise on the forest-trees of North America, written in French, and published at Paris in 1812, was soon afterwards translated by Mr. Hillhouse into English, and printed at the same place. This is a splendid work, containing a great number of beautiful illustrative engravings, and embodying a vast deal of information in relation to our forest-trees, which, though it bears more especially upon the commercial and agricultural interests, is yet, in many instances, of considerable value in a medical point of view.

We have now come to the period of contemporary writers, in relation to whom prudence would recommend silence; as praise, though deserved, might to over-delicate ears sound like adulation, and censure might be ascribed to envy or the ill-will of opposite interests. Yet if we yield to this squeamish delicacy on the one hand, and to the fear of derogatory imputations on the other, we deprive merit of its best reward —the knowledge, namely, that it is justly appreciated, while impertinent ignorance is allowed to strut about with impunity, and impose its fooleries or knavery upon modest simplicity as the dictates of truth. I scarcely know why I should preface by these generalities the introduction to your notice of two works, which, from an American pen, deserve nothing but praise, and the character of which is so well established, that no commendation which I might bestow upon them would be ascribed to other motives than a sense of justice and patriotic pride. I confess, gentlemen, that I do feel some pride in naming to you the *Medical Botany* of Dr. Wm. P.

C. Barton of Philadelphia, and the *American Medical Botany* of Dr. Jacob Bigelow of Boston, not that these productions offer a claim to the highest rank as works of science or art, but that, considering the materials at command, the state of the arts among us, and the meagre patronage they were likely to receive, the enterprise, industry, zeal, and, I may say, success with which they were executed, and the great advance which they exhibit beyond whatever previously existed here, are calculated to do honor to all of us as fellow countrymen of their authors. The design of their execution appears to have been nearly simultaneously conceived, and they were both published in the year 1817. They consist of descriptions, somewhat ample, of our medicinal plants in all their interesting relations, with colored engravings of these plants, and all sorts of references. It might be invidious to discriminate between them; but if I were to venture an opinion of their relative merits, I should give the palm decidedly to the Philadelphia work upon the score of art and elegance of execution, while that of the Boston Professor might well dispute the precedence on the score of science and research. They have conjointly placed our native Materia Medica on a much higher footing than it stood upon before; and nothing has been subsequently published which could have the least tendency to throw them into shade.

To bring our hasty review down to the present time, we have only to allude to the facts, that in the various treatises upon the general subjects of Materia Medica and Pharmacy, which have appeared in this country, our own medicines have received their share of attention; and that the Journals have continued to contribute occasional articles, either containing new facts, or presenting what was before known in a new light.

There is, however, one circumstance connected with our present subject which it would be improper to pass over wholly without notice; I allude to the chemical analysis of many indigenous medicines, which has resulted in a much more accurate knowledge of their composition, and a juster view of their

pharmaceutical relations than previously existed. The particular results have been consigned to the Journals, and cannot of course be mentioned here; but such of them as are of practical value to the physician will be noticed under the heads of the several medicines in my lectures. We are indebted for them chiefly to graduates of the Philadelphia College of Pharmacy, which appears to have afforded to its students the same stimulus, in their particular pursuit, which was exerted by our own school, at a period of its history already alluded to, upon the candidates for its honors.

In no part of the United States, perhaps, has our indigenous Materia Medica been practically cultivated to the same extent as in New England, and particularly in Connecticut. Several medicines of native origin are, I am told, habitually employed by the regular practitioners which are little if at all used elsewhere; and Professors Ives and Tully, who have successively lectured on Materia Medica in the Medical Department of Yale College, are said to have offered to the student a minuteness and a variety of information upon the physiological effects and therapeutical uses of those medicines, which would be in vain sought for in books. It is to be hoped that the present professor may some time consent to share with his medical brethren in general his peculiar knowledge; for it must be confessed that there is nothing in which we are more deficient than in accuracy and precision of acquaintance with the virtues of most of our indigenous medicines.

It is worthy of mention, in connexion with this subject, that particular attention has been paid to the collection and preparation of indigenous plants by the Shakers, who furnish, indeed, to the shops most of their supplies, and generally in the best condition. An extensive business of this kind is carried on by the Shakers of Lebanon in New York, and, during a recent journey in Ohio, I found that at their settlement in that State they were cultivating the same source of profit.

Our view has hitherto been confined to the state of Materia Medica in relation to the objects of that science furnished exclusively by this country; we are now to consider the history

and condition of the science in its general relations among us. A few words will embrace all that need be said on this subject; for the history of Materia Medica in the United States has been, till within a few years, identical with that of the same branch of knowledge in Europe. While we were colonies of England, we were willingly indebted to the mother country for intellectual supplies as well as for manufactures, and, considering our credit as involved in hers, did not seek an independent national reputation. Our medical doctrines and modes of practice, the choice of remedies and their modes of preparation, even the medicines themselves and all their pharmaceutical modifications, were received from Great Britain with a filial respect which did not allow us to suspect the possibility of anything better or more applicable to our condition. Her authorities were our authorities, her books were our books, and in great measure her physicians were our physicians; for the great west was then the Atlantic border, and the young medical men from the mother country found a welcome as cordial as that now extended, on the banks of the Mississippi, to the alumni of our own schools. Nor did our professional cease with our political dependence. For many years after we had thrown off the yoke of the mother country, we continued to look to her authors almost exclusively as our guides in medicine. So far as concerns the Materia Medica, the first effort to supply ourselves was in the publication, in 1806, of the American Dispensatory by Dr. John Redman Coxe. This work was little more than a reprint of the Edinburgh Dispensatory, with an alteration in the arrangement of the articles, and the introduction of some notices in relation to our indigenous medicines. Such as it was, however, it acquired great celebrity, passed through numerous editions, and for many years was the almost exclusive pharmaceutical guide-book of a great portion of the Union. In 1810 appeared the American New Dispensatory by Dr. Thacher of Massachusetts, which, with greater claims to originality, was scarcely less meritorious in other respects than its predecessor, and had the advantage of presenting more elaborate

and better digested accounts of our native medicines than had yet appeared in any one work. This soon divided with Dr. Coxe's book the patronage of the country, circulating more especially in the Eastern States, though it also penetrated into a few shops and libraries in the more southern sections.

In the year 1817, a new era in the history of our science in America commenced with the publication of Dr. Chapman's work on Therapeutics and Materia Medica. Hitherto we had done little more than add to the products of the European press our peculiar knowledge in relation to indigenous medicines. Dr. Chapman took a bolder flight; and by the publication of a systematic and original treatise, containing elaborate doctrine, interesting practical views, and highly important therapeutical facts of a general character, placed us at once upon a footing with English authorship in this department of medicine. If his work be considered rather in reference to the physiological effects or practical application of medicines, than to their history as objects of physical science or pharmaceutical management, though, as they who have attended my lectures well know, I cannot coincide in all the opinions which it advocates, I can with sincerity say that I know of nothing superior or equal to it among the treatises on Materia Medica in the English language existing at the time when it was written. The work of Dr. Chapman was followed in 1822 by the Materia Medica of Dr. Bigelow, and in 1825, by the Materia Medica and Therapeutics of Dr. Eberle. The former was intended as a sequel to the Pharmacopœia of the United States, of which it may be considered as an explanatory commentary, without claiming to rank as a finished treatise upon the science. The latter is an elaborate work, prepared with great industry and research, and containing much very valuable information. I should not be doing justice to the student without recommending to him, especially in the intervals of his winter labors, the diligent perusal of Dr. Chapman's and Dr. Eberle's treatises.

Of the work which came next in the order of time it does not become me to speak except in the most general terms. The United States Dispensatory, which has been adopted as the text-book of the ensuing course of lectures, made its first appearance in 1833. I may, perhaps, be permitted to say of that portion of the work executed by my friend, Dr. Bache, which concerns for the most part the chemical articles, that it is marked by all the scrupulous accuracy, precision, and faithfulness, which so favorably characterize the author in all his relations.

To complete the list of American works upon Materia Medica, it remains only to mention the "New Remedies" of my friend and co-laborer in this field of medicine, Dr. Dunglison, which was published in 1839. This is a valuable treatise, containing much information in relation to new or little employed remedies, and might advantageously lie on the table of every practitioner, with a view to occasional reference.

Having seen what has been written upon the subject of which we are treating, we are naturally led to the inquiry, what has been done or discovered in this country towards the advancement or improvement of the science of Materia Medica, independently of the additions it has received from our indigenous products. The amount of our contributions in this way is not large. Most medicines have been so long subjected to all sorts of trial, in every variety of disease, that to fall upon a really new physiological property or therapeutical application is a rare occurrence; and even where an individual may imagine that he has made some interesting or important discovery, the chances are great that it is a long known and recorded fact, of which he was ignorant from deficient means of information. In the short annals, therefore, of our independent medical history, we are to look for very few improvements of the kind alluded to. Still, by running our eye over the medical Journals we shall find that our soil has not been entirely barren. From among the great mass of suggestions and reported experience, a few facts might be picked

out here and there which have the stamp of novelty. You will observe that I am now speaking of the general Materia Medica, exclusive of that which is the peculiar product of our native vegetation, and in which our contributions have been ample. To mention each individual case in which an old medicine may have received a new application at our hands, would be out of place on this occasion. Such notices belong to the special history of medicines, and will be introduced into my lectures under appropriate heads. There have, however, been two discoveries of American physicians which merit particular notice, as they have been the means of introducing, out of the mass of materials everywhere accessible, new and effective remedies into general use. One of these discoveries is that made by Dr. Coxe, of virtues analogous to those of opium in the inspissated milky juice of Lettuce, which has consequently been introduced into the officinal catalogues both here and in Europe, under the name of Lactucarium; the other is that by Dr. Stearns, of the State of New York, of very peculiar and highly important properties in Ergot, which have led to its universal adoption as an article of the Materia Medica.

There yet remains another point of view from which to consider the Materia Medica of the United States. In every civilized country of Europe it has been considered indispensable, in order to a due regulation of the nomenclature and preparation of medicines, to establish a system of rules, which should have the sanction of law. Without the uniformity resulting from such pharmaceutical codes, no physician could depend on obtaining from the apothecary the same medicine or preparation under the same name, and infinite confusion with its consequent mischief would result. These codes are put forth, under the title of Pharmacopœias, by colleges or other authorized bodies, and having the sanction of the government, constitute a part of the public law. Thus the Pharmacy of England is regulated by the London College of Physicians through their Pharmacopœia, that of Scotland in like manner by the Edinburgh College, and that of Ireland by the

Dublin College. In this country we were long without any such generally recognized code; and the preparations were made according to the directions of one or another of the British Colleges at the discretion of the apothecary, or even according to some favorite recipe of his own; so that compounded medicines of the same title were often entirely different in different sections of the country, and even in different shops of the same town. The first effort to remedy the evil of which I have any knowledge was made in 1808 by the Medical Society of Massachusetts, by which measures were taken for the preparation of a Pharmacopœia, which was published, and was afterwards adopted by the Medical Society of New Hampshire. But no general movement took place till about the beginning of the year 1820, when a Convention of Physicians, from various parts of the country met at Washington, and framed a Pharmacopæia which was intended to express the sentiments of the profession throughout the Union, and thus to acquire an authority which we have not the means of conferring on such a work by law. It was denominated the Pharmacopœia of the United States, and was received, to a considerable extent, as the pharmaceutical standard of the country; but its many defects and errors, such as are incident to a new undertaking, and especially to one in which numerous irresponsible hands are engaged, prevented its universal acceptance. Provision, however, had been made for the supply of these deficiencies by a revision at the end of ten years. Accordingly, in January, 1830, a second Convention met at Washington, by whose authority a revised and very much amended edition was published. This has been subsequently admitted by the country in general as an authoritative pharmaceutical code, though, in the absence of any legal sanction, it has not been altogether sufficient to restrain propensities to independent action on the part of individuals. In order to render the work still more worthy of the place which it claims to occupy, as well as to bring it up to the present level of our knowledge, a third Convention, which met at the commencement of the present year in Washington, provided for another

revision, to the aid of which the Colleges of Pharmacy were invited, so that the practical and peculiar skill of the apothecary might be brought into co-operation with the knowledge of the physician. This aid has been secured, and the Pharmacopœia has been submitted to a thorough examination, which it is hoped will end in such an improvement as to render it generally if not universally acceptable.

I have alluded to the Pharmaceutical Colleges. It is not inappropriate to the occasion to state, that these institutions, of which one has been in efficient operation in Philadelphia since the year 1822, and another, subsequently founded, is now in operation in New York, have contributed very greatly to improve the art of preparing medicines in this country, and, by elevating the profession of Pharmacy, have rendered it a much more efficient auxiliary to ours. The late Convention at Washington has, I think, merited well of the country in inviting the co-operation of these Colleges in an important national work, in which both professions are equally interested, and which can scarcely be satisfactorily completed unless by their joint labors.

And now, gentlemen, having conveyed you through a brief history of the Materia Medica in this country, will you allow me to urge upon you the application of your own efforts to the improvement of this branch of medicine, and especially of that portion of it which concerns our indigenous products. I know no fairer field than this in which to gain a name for yourselves, or accomplish something useful to your profession. Success would be doubly grateful to a patriotic spirit; for while your country would share in the honor which might accrue to one of her sons, she would enjoy the advantage also of a cultivation of her own peculiar resources. Can I not paint to your fancy a prospect which will rouse all your energies to realize it? Suppose that by a careful and laborious investigation, by a long course of varied experiment and accurate observation, you have arrived at the discovery of some valuable medicine hitherto concealed in the wilds of our country, or of some yet unknown peculiarities and powers of a

medicine already recognised? Your name is at once honorably known in connexion with your discovery; through life you will have the consciousness that you at least are not among those who pass undistinguished along their destined course, and leave no trace behind them; your children and your children's children will inherit the imperishable treasure of your reputation. In the pages upon which succeeding generations of students will dwell, your name will be connected with the record of the good that you have accomplished; in the lectures to which future aspirants for medical honors will listen, your claims will not be forgotten when your discovery is alluded to; perhaps from this very spot, some future Professor, giving, as I have done to-day, a history of the Materia Medica of our country, may cite your example as an honor to the Institution, and a powerful incentive to his pupils. It is something also to possess the consciousness that you have added to the credit of your profession, and have been a benefactor to your country and to mankind. These, it is true, are motives of action common to every honorable field of exertion; the peculiar inducements in that now offered to you are the deficiency of present culture, and the greater probability of a rich return for all the labor expended. Our native Materia Medica may be said to have lain fallow for several years. Pathology has by its fruitful yield drawn almost all floating labor to itself; and fashion has invested it with additional attractions. Our comparatively neglected science has, in the meantime, through the progress of general discovery, been accumulating renewed fertility, and will yield abundantly to properly directed culture. May I not hope that some of you, under the inducements which I have presented, or others which your own minds may suggest, will engage heartily in this work of investigation, in the pursuit of the high prize of honor for yourselves, your school, your profession, and your country?

But you must remember that such a prize is not easily won. We cannot guess ourselves, nor dream ourselves into honorable distinction. The pursuit of a creditable name is no lot-

tery in which the highest prize may be drawn by careless indolence, or self-satisfied ignorance. You must work, if you would gain the wages of labor.

Having thus called you to exertion, I may very properly be required by you to point out the best plan of beginning and conducting your investigations. Your first object will be to select some particular subject of inquiry. You may choose some indigenous plant, whose medicinal properties have already attracted the notice of the profession, but have not been thoroughly studied; or you may search amidst the rubbish of popular and domestic practice, and find something perhaps of value which has hitherto lain concealed; or, finally, you may examine the plants of our woods and meadows, and guided by the odor, taste, or other obvious property indicating some power of affecting the human system, may perchance be led to the discovery of a useful and hitherto unknown medicine. I would recommend the first course; as the catalogue of officinal or semi-officinal plants is already numerous, and it is desirable to sift this thoroughly before attempting to augment it.

In the very beginning, you must take care to avoid the too common error of explorers, of determining at all events to find something new—a determination which is apt to deceive the fancy into the belief that it has discovered what it has in fact only invented. Let your search be after truth, and nothing but truth. It may be as important to deprive a counterfeit medicine of its false credit, as to add a new one, though genuine, to the mass of circulation. You will perform an important service, if you can prove satisfactorily that one of the received medicines is quite valueless.

Having selected the subject of experiment, you are first to ascertain its effects upon the human system in health. Try it upon yourselves, upon your friends, upon persons of different sex, age, and temperament, beginning with doses which you know to be safe, and gradually increasing till its activity or inertness is evinced. Ascertain its influence upon the brain and nervous system, upon the stomach and bowels, upon the

heart as indicated by the pulse, upon the temperature of the body, upon the secretions, and in fine upon all the healthy functions. Note all these effects carefully as you observe them; but at the same time be very cautious not to confound those changes in the system which may result from mental influence, or from the operation of ordinary or accidental causes, with those which are the genuine product of the medicine. Do not be satisfied with a single trial in each case, but repeat it with varying circumstances till there can no longer be a doubt of the actual effect produced.

When you have sufficiently convinced yourselves of the efficiency of the medicine, and ascertained its peculiar physiological action, you are next to apply it to the treatment of disease; and here the same caution is requisite not to allow yourselves to be misguided by the influence of various disturbing agencies, nor to make hasty conclusions from one or a few trials. There is nothing in relation to which we are more apt to draw false inferences than the action of medicine in disease. Most complaints have a tendency to spontaneous cure, and will in general go on sooner or later to recovery, without the use, and often notwithstanding the use of medicine. In such cases, the last drug administered is apt to have the credit of the cure, though all its operation may have been to protract this result. There are a thousand causes which operate on the system in disease giving rise to changes not anticipated, which, without due caution, may be ascribed to the remedies employed. Against all these sources of error you must be on your guard, and above all against your own hopes, which will act powerfully in causing you to see things as you wish them.

Other points which will require investigation are the part or parts of the plant most effective, its relations to the usual menstrua employed in pharmacy, as water and alcohol, the best mode of administration, and the dose. Its composition and general chemical relations are also important objects of inquiry; but few medical men, and none who have not devoted an especial attention to practical chemistry, are capable of

conducting successfully those complex and delicate processes which are essential to accurate analysis, especially of organic products. This part of the investigation may, therefore, with propriety be left to the pharmaceutical chemist, within whose province it strictly falls.

To complete your work it will now only remain to record the results of your investigations. In doing this, your rule should be to put down everything exactly, plainly, and in as few words as possible consistently with perfect clearness. Your object will not be to produce an impression by means of rhetoric, but to establish facts in science: and these are always most striking in their native simplicity. We suspect the purity of truth herself, when she is disguised in meretricious ornament. You should endeavor in your narrative to present to the reader, in their proper order, all the materials for forming a judgment of which you may be yourselves in possession, and thus enable him to come to the conclusion you desire, perfectly satisfied of its correctness. No matter whether your inquiries have ended in the discovery of some new fact, or the refutation of some old error; in either case the result is truth, and the process by which it was attained is equally deserving of record. But be not in haste to publish your essay after you have prepared it. An author is seldom a good judge of his own productions when immediately from his pen. He views his offspring with a paternal, I might, perhaps, be allowed to say, with a maternal eye, which can see no defects, and often finds beauties when indifference would discover only deformity. Lay aside your manuscript for a time; let the ardor of composition cool, the pains of your mental labor be forgotten; you will then be able to judge of your own production more as a critic than as an author; and you may depend upon it that you will find much to amend, and rejoice that you have yet the power.

I have thus, gentlemen, accomplished the object which I proposed at the beginning of the Lecture. Much more might have been said on almost every point, and perhaps not un-

profitably, had time and space permitted; but in this world of limited power and limited opportunities, one great secret of doing well is to take a just view of the power and opportunity we actually possess, and adapt our aims and efforts accurately to them. This at least I endeavor to make a rule of action for myself; and you will find me governed by that rule in the subsequent Course of Lectures. We have only a certain amount of time allotted to Materia Medica. In arranging my course I have endeavored to find the just proportion between the importance of the several topics and the whole time, and to devote to each topic its due share of consideration, so that none may be entirely neglected. If I am thus induced to say less than lecturers often do upon certain prominent subjects, I have at least the advantage of giving some attention to others, which, though severally less important, are much more so in the aggregate. My great object is to give the pupil opportunities for acquiring such a knowledge of principles and facts as may serve as a basis to his own future labors. To render these opportunities available, your zealous co-operation will be requisite. Judging from the experience of the past, I have no doubt of such co-operation. I have not yet had occasion to complain of the want of due attention on the part of a class, and entertain no apprehension that, at the termination of the present course, I shall have cause to express a different sentiment. Should my efforts equally content your reasonable wishes, my highest ambition will be satisfied.

ART. LX.—SOLUTION OF IODIDE OF IRON.

By William Procter, Jr.

At page 13th of the present volume, a process was detailed for preventing the decomposition of solution of iodide of iron, by the addition of saccharine matter. Several who have employed it having stated objections, it was found on inquiry that either sugar or impure honey had been used in its formation. The paper above alluded to says, that either *sugar, uncrystallizable honey, or uncrystallizable sugar* may be used, but expressly gives the preference to the two last, as having the most power. Honey, when *properly prepared*, owing to its light color, is preferable to molasses. The object of preparing it is to deprive it of acidity, as well as color. The following formula, recommended by the committee of the Philadelphia College of Pharmacy, on the U. S. Pharmacopœia, is an excellent one, and yields a product that fully answers the proposed end.

Take of honey	Oss.
" diluted alcohol	Oj.
" prepared chalk	℥ss.

Mix the honey with the diluted alcohol, add the prepared chalk, agitate them well together, and heat the mixture till it boils—then filter, and by means of a water bath, evaporate the clear solution to the consistence of honey.

By pursuing this method for the preparation of the honey, this unstable preparation of iron is rendered permanent.

Note.—In the tenth volume, page 274 of this Journal, was published an article exhibiting a new process for the preparation of tincture of muriate of iron. In copying the paper, an error was made by which the quantity of tincture directed to be formed with two ounces of hydrochloric acid was *nineteen ounces*, instead of *nine and a half* ounces, the correct quantity. Those who were subscribers to the Journal at that time will please to note this fact, at the page where the error occurred.

ART. LXI.—SOME OBSERVATIONS ON THE AQUEOUS SOLUTION OF CARBONATE OF MAGNESIA, WITH EXCESS OF CARBONIC ACID, AND ON THE SALT WHICH IT AFFORDS BY SPONTANEOUS DECOMPOSITION. By JOHN DAVY, M. D., F. R. S.

I HAVE been induced to institute some experiments on the solution of carbonate of magnesia, in water strongly impregnated with carbonic acid gas, in consequence of the high repute, on very questionable grounds, which it has lately acquired as a medicine.

The solution I have used, is that prepared and sold by Mr. Dinneford, of New Bond street, with the designation of Dinneford's Solution of Magnesia, and with the following recommendation on the label: "The great advantages of this elegant preparation are, that being in a *fluid* state, and possessing all the properties of magnesia in general use, it is not likely to form dangerous concretions in the bowels; it corrects acidity and heart burn effectually, without injuring the coats of the stomach, as carbonates of potash and soda are known to do; it prevents the food of infants from turning sour, and in all cases it acts as a pleasing aperient particularly adapted to females."

Such a recommendation I should not have thought it right to notice, were it an ordinary quack eulogy, and unsupported by certificates given by respectable medical men; and moreover, were I not assured that great faith is placed by many persons in the asserted virtues of the preparation, and that the use of it is rapidly extending.

The first trials I subjected the medicine to, were made with a view to test the permanence of the solution; as by exposure to the air, in an open vessel, exposure to a temperature of 100° F., in a vessel loosely corked, and to the action of an air pump under an exhausted receiver.

The result in each instance was very similar; carbonic acid

gas escaped, or was expelled, and a salt was deposited in the form of minute prismatic crystals.

This separation of magnesia in a solid form, on the disengagement of the excess of carbonic acid, was no more than might have been expected from the known nature of the compound, and the artificial manner in which it is formed by the condensation of the gaseous acid; and must be considered as quite incompatible with the declaration of its "fluid state" in the stomach and bowels, and sufficient ground to call in question the propriety of placing confidence in the preparation, as a medicine, in preference to common carbonate of magnesia or calcined magnesia, than either of which it is so much more costly an article.

The prismatic salt deposited on the escape of the excess of carbonic acid, has been examined by several chemists; resting chiefly on the results of the experiments of Berzelius, and the late Dr. Henry, it has been considered as a hydrated carbonate of magnesia, composed as follows, viz.

29.61	Magnesia.
32.23	Carbonic acid.
10.27	Water expelled at 212° F.
27.90	" " by a higher temperature, as by ignition.
100.00	

or of one proportion and half of magnesia, and carbonic acid, one of water expelled at 212°, and three proportions of water expelled by a higher temperature. Compared with the common carbonate of magnesia, from results which I have obtained operating on the latter, this appears to differ chiefly from the former in possessing a half proportion more of magnesia, and one proportion less of water, being composed of

41.52	Magnesia.
33.31	Carbonic acid.
17.47	Water expelled at 212°.
7.70	" " at a higher temperature.
100.00	

These results accord tolerably with those of other inquirers who have examined this compound; the variation or want of perfect accordance, probably chiefly depends on the degree of dryness of the preparation examined, or on the quantity of water retained in the powder admitting of expulsion at 212°, which water, being hygrometrical, at least in part, must vary in the degree of dryness of the atmosphere to which it is exposed.

The method by which these two compounds of magnesia and carbonic acid were analysed, was a simple one, admitting of considerable accuracy.

The quantity of water expelled at a temperature of 212°, is determined by exposure of an hour or more to the heat of a steam bath; the quantity of carbonic acid, by acting on the compounds, very carefully weighed by muriatic acid, saturated with carbonic acid over mercury in a graduated tube; and the quantities of magnesia and of water expelled at a higher temperature than 212°, by the action of a red heat, continued for two or three hours, till no further loss of weight was produced by a continuance of the high temperature. In estimating the proportion of carbonic acid, the calculation was made on the ground that 100 cubic inches of this gas weigh 47.262 grains.

A few words relative to the properties of the first-mentioned carbonate. Its tendency to crystallize is remarkable; however obtained, even when rapidly separated by the expulsion of the excess of carbonic acid by heat, it has been deposited in a crystalline form. This form is not obvious to the naked eye, but, when the powder is examined by the microscope, each particle is found to be a distinct prismatic crystal. And the persistence of this form is no less remarkable; it is not destroyed by decomposition; the powder after ignition, after the expulsion of the whole of the water and carbonic acid, under the microscope shows no alteration; each particle is still prismatic, and, when moistened with water, is transparent.

It is asserted that this carbonate readily loses the water with

which it is combined. In a dry atmosphere it looses a portion of the water, which may perhaps be considered as hygrometrical, and at the same time loses its transparency ; but I find, as has already been remarked, that a temperature of 212° expels only one portion, and that a high temperature is requisite to expel the three remaining proportions, and which are probably the strictly chemically combined water.

It is also said that this compound is altered by the action of cold water, and by boiling water; that, in one instance a solution of bicarbonate of magnesia is formed, and an insoluble carbonate containing a smaller proportion of carbonic acid; and in the other, that the same insoluble subcarbonate is produced, but without the solution of bicarbonate, the proportion of carbonic acid required for this being expelled in the form of gas. The results of the trials I have made have not confirmed either of these conclusions. It has appeared to me to dissolve both in hot and in cold water without undergoing any decomposition. I have not been able to obtain an insoluble subcarbonate of magnesia by acting on the prismatic salt by cold water, or carbonic acid gas from it by boiling water,—for instance, boiling it in distilled water in a retort connected with a mercurial pneumatic apparatus. It is true, that when this carbonate is thrown into hot water, there is a disengagement of air, but the air is common air mechanically entangled, not carbonic acid gas which had been chemically combined.

Both the hot solution and the cold, on evaporation, yielded the prismatic compound. 1000 grains of water at the temperature of 60°, appear capable of holding in solution about 4 grains ; thus 326.6 grains of the solution of the carbonate after the excess of carbonic acid had been expelled by the air-pump, afforded, on spontaneous evaporation, 1.5 grain of crystalline salt.

Whether this slight degree of solubility can be useful, considering the qualities of the compound as a medicine, or whether the crystalline spicular prismatic form which it assumes on separation of the excess of carbonic acid by which the carbonate was brought into solution, can be injurious to the coats

of the stomach, as a mechanical irritant, it is far from easy to determine; the probability is, reasoning analogically, that neither the one or the other circumstance, medicinally considered, is of much consequence.

Edin. Lond. and Dub. Phil. Mag.

ART. LXII.—NOTICE OF CHELIDONINE AND PERROPINE.

M. Polex has found in the root of the *Chelidonium majus*, a true alkaloid (chelidonine) and a sub-alkaloid, (perropine,) a principle analogous to narcotine and narceine, and to which the juice owes its color. On distilling this plant with its root at the time it was in flower, either with or without an alkali, products were obtained having the narcotic odor of this vegetable.

In the acid product of the distillation without alkali, formic and acetic acids were manifest; that obtained by the addition of potassa contained ammonia.

Preparation of these two Alkaloids.

The dried root of the Cheledonium majus is reduced to powder and boiled with two portions of alcohol. These infusions were distilled, and to the residue an equal weight of water added, and the remainder of the alcohol separated by distillation. From the remaining solution, when thrown into an evaporating dish, and completely cold, a soft resin is set free; this is separated by the filter, and the two alkaloids precipitated by carbonate of soda. The precipitate is collected on a filter and washed with cold water, and then dissolved in boiling alcohol of 84°, and the solution allowed to cool. Proceeding thus, the greatest part of the chelidonine crystallizes, and the remainder on evaporation of the alcohol. The crystals are to be washed with alcohol, to separate any extractive. The mother water and the washings are evaporated at a moderate

heat, on which the pirropine crystallizes with a little chelidonine, in yellow plates, and a part is deposited on the sides of the vessel in blackish discs.

It is well to remark, that we should not operate on a very small quantity of the root, because the proportion of pirropine is very small. The greater part shows itself with an aqueous or resinous extractive; this latter dissolves in weak acids and is precipitable by the alkalies, but is not crystallizable; it is combined more particularly with the soft resin, and forms with it, together with chlorophylle and a fatty matter, so intimate a union that it is difficult to separate them. It appears that pirropine is found especially in the old roots. In the root and whole of the young plant, in the yellow lactescent juice, it is particularly united with aqueous extractive.

Properties of Chelidonine.

Chelidonine crystallizes partly in tables and partly in cubes, and its variations. In the crystalline state it dissolves with difficulty in alcohol and in hot ether; from which it crystallizes on cooling. Concentrated acids, even with heat, act slightly upon it; nitric acid colors it yellow, and sulphuric black. Weak acids form with it colorless salts, which readily crystallize, and have an astringent and very bitter taste. Chelidonine dissolves easily in the fixed and volatile oils, by the aid of heat, and the solutions have a bitter taste.

Its alcoholic solution exhibits an alkaline reaction. If to a solution of the acetate of chelidonine, tincture of galls, or solution of subacetate of lead be added, abundant white precipitates are produced. Tincture of iodine produces a precipitate the color of kermes. Chromate of potassa precipitates it of a deep yellow, and chloride of gold of an obscure reddish yellow; the alkalies white, &c.

Properties of Pirropine.

Pirropine crystallizes in stars formed by the union of colorless, transparent prisms. By cooling, they lose their trans-

parency and become brownish. Acids act slightly on them when cold, but with heat dissolve them—assuming a golden yellow or reddish color. If these crystals are in contact with a strong acid, they likewise become of a fine fiery red. These combinations are, for the most part, but little soluble in cold water, and have a taste but slightly bitter, but acrid and pungent.

Pirropine dissolves with difficulty in cold ether or alcohol, but readily when boiling. The fixed and volatile oils dissolve it by the aid of heat. Exposed to heat it fuses, burns and gives off ammoniacal vapors. Tincture of iodine precipitates the acetate of pirropine of a crimson color; chloride of gold of a brownish yellow; chromate of potassa, of a deep yellow, tartrate of antimony, chloride of iron, protonitrate of mercury, bi-chloride of mercury and nitrate of silver of a yellowish white. Alkalies produce a white precipitate. Tincture of galls, and subacetate of lead, effect no change. The alcoholic solution does not exhibit an alkaline re-action.

J. de F.

Journ. de Chim. Med.

ART. LXIII.—GRANATINE. By M. Landerer.

This chemist has obtained this substance by exhausting with several portions of alcohol, the rind of the unripe fruit of the pomegranate. The alcoholic extract is bitter and very astringent. This is dissolved in water, and albumen added to separate the tannin; the liquor is then filtered, evaporated, and treated with weak sulphuric acid, which forms a very bitter solution, from which caustic alkali throws down an abundant precipitate. This precipitate was dried, and subjected to dilute hydrochloric acid, which dissolved a part; the remainder was then dissolved in alcohol, from which was obtained crystals partly stelliform, and partly mammelated, in the proportion of five grains from five pomegranates.

This substance, heated in a platina crucible, burnt with the odor of burnt bread, it dissolves in all the diluted acids; with concentrated nitric acid it becomes blood red, and gives rise to a substance of the nature of wax.

We do not consider these details as sufficient to characterise perfectly this substance, and to assign the rank which it ought to hold.

J. de F.

Journ. de Chim. Med.

ART. LXIV.—UPON A PALE CINCHONA OF BAD QUALITY FOUND IN COMMERCE.

This bark is that of the *Cinchona ovata* of the *Flora Peruviana*, it does not exist generally in commerce, and is found but rarely mixed with Loxa Bark.

It is without doubt the high price of the Cinchonas, which has occasioned the introduction into the market of this bad quality of bark. Many parcels of it have been already sold, and we have been informed that the central Pharmacy has been furnished with fifteen or sixteen seroons.

The bark of the *Cinchona ovata*, has been examined by M. Manzini, pharmacien interne to the Hotel Dieu, who has described its characteristics. M. Bouchardat, has made an analysis of it, and has obtained from it neither quinia or cinchona. A committee of the Academy of Medicine has been entrusted with its examination, and at some future period we shall make known the result of their labor.

This cinchona, as it ought not to be employed for any of the pharmaceutical preparations which are employed, either powder, wine, syrup, extract or tincture, should be rejected by every conscientious pharmacien. According to M. Manzini, it bears in Peru the name of *quinquina jean*, and is designated by the natives by the application of *Patte de Canard;* it is employed to mix with the good cinchonas.

It has a yellow color, mixed with gray and pale yellow, it is very light, its internal surface is of a deep reddish color and covered with powder. Its odor is feeble; its taste at first a little bitter, soon becomes developed, and is followed by a little astringency. The powder is of a pale brown cinnamon color.

The difficulty which exists of recognising the cinchonas, leads us to urge the necessity of establishing the practice of entrusting their sale to particular individuals, possessed of sufficient skill to determine positively the value of each, and who, in case of doubt, should make an analysis of a suspected bark.

It may be alleged that this method would be too restrictive for trade, but it may be advanced that the public interest should be of paramount importance, and that such precautions are necessary, that the numerous patients who employ the cinchonas may not be injured by them.

It is desirable that the cinchonas brought to France should be examined by commissions, who will classify them according to their value, and who will reject those which ought not be employed. These commissions to be composed of persons who have given proof of skill, and are familiar with the different species of bark. A. C.

Journ. de Chimie Medicale.

ART. LXV.—NOTE UPON A SUBSTANCE OF FOREIGN ORIGIN RESEMBLING MYRRH, AND THE PECULIAR PRINCIPLE CONTAINED IN IT. By M. Planche.

Naturalists are still in doubt with respect to the particular plant which produces myrrh, although this gum resin has been employed from the earliest antiquity, either as a perfume or as a therapeutic agent. Better informed as regards the intimate composition of this immediate product by the labors of Cartha, of Neuman, of Braconnot, of Pelletier, and more recently by the analysis of Brandes, whose results most nearly approach those of our learned compeer; sufficiently instructed on the other hand, upon the nature of a new or false myrrh, examined in 1829, by M. Bonastre, we find two points of departure sufficiently well established to determine in what the new substance, with which we are about to occupy ourselves, is analogous to common myrrh, and in what it differs from it.

This substance made part of a collection which I obtained, about two years since, of an old druggist of Paris, and which he had picked himself from a case of myrrh, so fully

persuaded was he that the samples separated were of the purest kind. The resemblance to certain samples of this gum resin, must in fact have been exceedingly close, for a dealer, as habituated as he was to see daily the drug, to be so deceived. Of forty pieces which I tried, thirty-five were found to be false myrrh, and I confess, that on my own part, I shared with him the mistake, and should have still continued in it, had not a peculiar circumstance led me to examine matters a little more closely.

Destitute as I am of all idea of the origin of this natural product, I shall designate it in anticipation by the name of myrrhoid, because it is especially from its form that it possesses a resemblance to myrrh, and moreover in order to distinguish between it and other myrrhs which are false or pretended to be such.

This myrrhoid presents itself like myrrh, in tears of an irregular shape, some mammaleonated or striated of a yellow color, somewhat opaque and covered over with a grayish powder; these are most numerous; others, of a reddish brown, are more transparent, exhibit a vitreous fracture, and externally are less rugose than the preceding. Myrrhoid, which has for a long time been in contact with true myrrh, retains a little of its odor, but it becomes inodorous, if after having brushed it to remove the powder, we plunge it into feeble alcohol, and expose it for a few days to the open air.

This myrrhoid has a bitter, disagreeable taste, to a certain extent resembling that of myrrh, but is very acrid and a little pungent; a taste which remains for a long time in the fauces; its powder is inodorous, of a yellowish white color.

Action of water upon the myrrhoid.

A portion of this substance in powder, rubbed up with fifteen parts of water in an agate mortar, afforded an almost transparent solution, very little colored, from which there was separated by repose a soft substance, of a yellow color, B, which could not be dissolved in a new portion of cold water. When precipitated, it formed about the $\frac{3}{100}$ of the myrrhoid;

and we shall see, further on, when speaking of the direct action of alcohol, that it exists in it to a greater amount.

One part of the myrrhoid in powder (100 grains) triturated in an agate mortar with two parts of water, (200 grains) afforded an opaque mass, of the consistence of mucilage, homogeneous in its consistence, which was mixed by trituration with about thirty parts of cold water; the liquid still transparent, and very little colored, in a short time exhibited a multitude of small oleaginous drops, which at last became united in masses at the bottom of the vessel, having the appearance of a resinous liquid, to which we shall return directly, and which resisted solution in a large quantity of boiling water.

Above it, was held in suspension another matter, very light, very voluminous, giving to the liquid the appearance of a thinner solution of gum tragacanth; it has been impossible for me to determine the proportion of it, inasmuch as by desiccation it was reduced, so to speak, almost to nothing. This substance, morever, appeared to me analogous to tragacanthine.

In place of rubbing the myrrhoid in powder with water, it was allowed, in substance, to remain tranquilly in water for ten or twelve hours; the solution did not take place as above, but instead of the small portion of insoluble matter uniting itself in soft mass, it presents light flocculi floating upon the liquid, when it is agitated, and separating when allowed to stand. It may be remarked, in passing, that myrrh when placed under the same circumstances presents a different action. The aqueous solution of the myrrhoid is very bitter and acrid; it sensibly reddens litmus paper. It is troubled by alcohol, and precipitates in white flocks, leaving the supernatant liquid perfectly clear and colorless. It is rendered equally cloudy when exposed to heat or the solar rays, and preserves its opacity to the end of the evaporation, leaving a yellow matter, dry and translucent, which again forms with cold water a limpid solution. This aqueous solution of the myrrhoid is formed almost entirely of a peculiar matter, which we shall designate by the name of *Myrrhoidine*.

The resinous matter B, as we have separated it mechanically, is united with a certain quantity of water, which causes it to be in the state of a hydrate. In this state, it is insoluble in a new quantity of cold or boiling water; it obstinately preserves, in spite of repeated washings, the acrid and bitter taste of the substance when entire; it is soluble in five times its weight of absolute alcohol.

This matter B, insoluble in cold water, was dissolved in alcohol. This solution, much diluted with water, was not rendered cloudy; allowed to evaporate, it remained transparent; then, in proportion as the evaporation advanced, the oleaginous drops were perceived floating upon the liquid, and assuming a consistence in appearance resinous, when they were attached to the dry sides of the capsule.

Dissolved in five parts of absolute alcohol, this matter resumed, when water was added to the solution, the form of transparent drops, the mixture not appearing clouded, but rather presenting the appearance of water, in which had been agitated a few drops of fixed oil with a tube. The resin of the myrrhoid is not soluble in ether.

Direct treatment of the Myrrhoid by Ether.

The myrrhoid was exhausted by three successive decoctions in alcohol, previously reduced to fine powder. The hot solutions, filtered and placed in a flask, allowed nothing to deposit by cooling; united and evaporated by a moderate heat, they left, as a residuum, a yellow substance of the consistence of turpentine, transparent, extremely acrid and bitter; when hot, it was so ductile that, if a rod was just placed in it, it could be drawn out like melted glass. A small mass of six centigrammes could thus afford a thread more than two metres in length. Brought in contact with the flame of a candle, it melted without taking fire—without smoking like the resins, and finished by becoming black.

This substance, obtained by alcohol, is very bitter, but this bitterness is essentially different from that of myrrh; to it succeeds an acrid taste, which for a long time remains in the

throat. It is very soluble in cold water without residue, and in alcohol and ether.

It is the same matter which, in the treatment by water, we designated under the name of myrrhoidine.

Treatment, by water, of the residuum of the myrrhoid insoluble in boiling alcohol.

The portion of the myrrhoid, which had not been acted upon by alcohol, was heated to ebullition with a sufficient quantity of water: it was equally soluble in a small quantity of cold water. The solution was still further diluted to separate some portions of ligneous matter, or sand, foreign to its composition. This solution being evaporated, left a residuum, which had the flat taste of gum, without any after bitter taste or acridity.

In equal weight, the mucilage which it formed with water, was a little less consistent than that of gum Arabic. But if it be recollected that when gum Arabic is dissolved and dried, according to Berzelius, it retains seventeen per cent. of water, it will be seen that the two mucilages are nearly the same.

M. Pelletier has seen, under the same circumstances, the gum of myrrh produce a mucilage thicker than that of gum Arabic. The gum of the myrrhoid renders the fixed oils equally as miscible as gum Arabic.

When the myrrhoid is treated directly with boiling absolute alcohol, so as to remove from it all that it contains soluble in this menstruum, ten per cent. of myrrhoidine is obtained—the remainder is gum.

When, on the contrary, the alcohol is made to act solely upon the portion of the myrrhoid, soluble in cold water, but seven per cent. is obtained, and this ought to be the $\frac{3}{100}$, having been separated by water. Hence it follows, that the dried product of the aqueous solution of the myrrhoid is a definite combination, composed of seven parts of myrrhoidine and ninety-three parts of gum; and that the natural myrrhoid, when entire, is composed of

Myrrhoidine,	10
Gum, about	88
Tragacanthine, or foreign matter,	2

Action of Ether on the Myrrhoid.

The powder of this substance having been agitated with cold ether, was decanted at the termination of an hour; this ether, when evaporated by the atmosphere, left an oleaginous matter, staining paper like oil, and remaining when exposed to heat, but not extending itself. The paper became dry, as if it had been impregnated with a resin. It was evident that this matter was neither resin or fixed oil, for it adhered to the fingers when the capsule was heated and dissolved completely in cold water without losing its transparency. It dissolved with equal facility in alcohol, and this solution was not rendered cloudy by the addition of water in any proportion. I know of no oil or resin which possesses these properties. It is still, in this case, the myrrhoidine which was dissolved by the ether.

Myrrhoidine.

Myrrhoidine has the appearance of gum Arabic; its taste is bitter and acrid. It dissolves in water as easily as the purest gum, and is also equally soluble in alcohol and ether. It enters easily into fusion. Unsized paper plunged into it is stained as if by a resin; spread upon sized paper, it communicates the brilliancy of the handsomest varnish.

Myrrhoidine is extremely soluble in the essence of turpentine. Olive oil, cold or heated, has no action upon it: in the latter it melts, and becomes adherent to the tube with which an attempt is made to incorporate it. It can be ascertained that the oil retains none of it in solution, by dropping the oil after it has become cold, or treating it with ether after it has been decanted.

The aqueous solution alters the color neither of litmus paper or turmeric.

The subacetate of lead,	do not affect it.
The nitrate of silver,	
The Hydrochlorate of tin,	
The sulphate of copper,	

The sulphate of iron renders it slightly cloudy.

With the tincture of galls it is clouded, whitened, and forms a white precipitate, soluble in an excess of alcohol.

With the solution of pure tannin there are the same results.

Myrrhoidine dissolves completely in liquid caustic potassa; the solution, when saturated with nitric acid, becomes green and transparent.

Ammonia has the same effect as potassa.

If cold muriatic acid is made to act upon the dry bitter matter, in proportion as the solution takes place the acid assumes the pale yellow color of Malaga wine, and soon passes to brown; a peculiar aromatic odor is disengaged.

The addition of water to this solution, precipitates the myrrhoidine from it, under the form of glutiniform filaments. This deposit, washed, to separate from it the excess of acid, loses nothing of its bitter and acrid taste; its solubility in water is considerably diminished. This substance dissolves as before, in absolute alcohol, but as it has lost some of its affinity for water, the alcoholic tincture is clouded by water, precisely as a resinous tincture is troubled, or the essences.

Pure concentrated sulphuric acid, poured upon myrrhoidine in powder, produces solution without the disengagement of sulphurous acid; this solution has exactly the same color as black balsam of Peru. Mixed with water, it renders it cloudy, passing to a dirty white, and deposits soon after light flocks of the same color. Nitric acid dissolves myrrhoidine when cold, without disengaging nitric oxide. The solution, of a light yellow color, is rendered cloudy by the addition of a small quantity of water. When more diluted it becomes limpid.

Soda, potassa and ammonia, either in the caustic state, or that of a carbonate, produces no appreciable effect.

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ART. LXVI.—NOTE UPON THE MEDICAL NATURAL HISTORY OF A CONCRETE JUICE COMING FROM BRAZIL, UNDER THE NAME OF GUARANA.

As the utility of this substance, as a tonic, has been stated anew, and as it also contains *cafeine*, we are induced to make known its origin more particularly than has yet been done. In fact, it was in the first instance announced in the year 1817, and described by Cadet Gassicourt,* without his pointing out the plant by which it was produced. The learned Bavarian botanist, Von Martius, did not determine this until the year 1826. Theod. Martius, the younger, made an analysis of the juice or extract, and determined the presence of *Guarania;*† a bitter principle without alkaloid properties. Trommsdorff, who examined it also, in 1831, supposed this guaranine to be similar to caryophylline. It has no more effect than the latter upon animals to whom it is exhibited.

The name Guarana does not belong to the plant from which this product is derived, but rather to the half savage people who extract it, and employ it themselves as a necessary digestive for their diet, which is entirely vegetable. Travellers have found the greater portion of the tribe of the Guaranis dispersed between the rivers Parana and Uruguay, in those marshy countries of Buenos Ayres and Paraguay, which lie between 29 and 30 South Latitude, living solely upon manioc, ignames, and corn. They are very weak, pale, indolent and depressed, although of tall stature, yet lank.

On this account, it is that these Indians became easily sub-

* Journal de Pharmacie.

† Chimie de Berzelius, tome v., p. 189.—*Fr. Trans.*

jected to the missions of the Jesuits and others, without having recourse to arms, and converts to Catholicism; whilst the more carniverous races, possessed of horses, to the present time have remained ferocious and untameable.

It is easily comprehended, then, that the Guaranis are under the necessity of uniting a tonic with their daily food. They unite the *guarana*, therefore, constantly either with the fecula of the manioc, or with chocolate; they also mix it with their sugary drinks, &c., for the cure of dysentery or diarrhœas, to which they are exposed by their too debilitating nourishment.

The tribe of *Maubes* or *Mauhés* especially, in the province of Para, or of Tapajoz, near the river Maragnon, (Upper Amazon,) near the city of Topinambarana, prepare a large quantity of guarana. The shrub which affords it forms a *cipo;* a vine-like thicket; the stem climbing; the leaves winged. The seeds are collected in October and November, contained in the capsules, which must be exposed to the sun in order to open. These seeds are covered with an arillus of a flesh color, which is separated by simple pressure. The pellicles, when separated and dried, furnish a rich coloring matter for dying the teeth.*

Martius has classed this twining shrub under the name of *Paullinia sorbilis*, (on account of its employment in drink,) in the Class Octandria, order Trigynia, of Linnæus, and in the family of Sapindaceæ, of Jussieu.

The calyx has five sepals; the corolla four petals; each capsule is trilocular, with three coriaceous valves. The seeds are without albumen, almost corneous, lenticular, and embossed; their perisperm is of an ashen gray color, of a bitter taste, not disagreeable, and a little oily; the membranous arillus detaches itself by desiccation. There is found in the Peruvian forests another Paullinia, the arillus of which is more succulent and nutritive, (*Semarillaria subrotunda*, Ruiz and

*Extract from the manual of Brazilian Agriculture of C. A. Taunay, Rio Janeiro, 1839, by the Honorable Lemaine Lisancourt, of the Academy of Medicine, a work recently cited of Brazil, by the Botanist Guillemin.

Pavon;) other Indian Sapindaceæ have excellent fruit, (*Euphoria*, *Dimocarpus*, *Nephelium*, &c.) It would be interesting to ascertain if their seeds contain *cafeine*, although this family has no botanical relations with that of the Coffeaceæ or Rubiaceæ. The true species of Paullinia and Serjania are American.

To prepare the guarana, the cleansed seeds are pounded in a mortar, they are then roasted upon an earthen plate, as cacao. The powder thus obtained, is moistened with water, and left during a night. The seeds of the Paullinia, coarsely bruised, are also mixed with it. This soft mass is made into cylinders or cakes pointed at both ends, eight inches long, or formed into boluses or loaves, with a neck, weighing a pound or more. These are dried in the sun, and better still by the smoke of a fire, suspended to the roofs of the huts of these people. In this way they harden and become black. The internal portion also becomes brown with time, as I have seen in numerous specimens.*

The guarana can be preserved for several years; the Guaranis envelope them in the leaves of the Scitamineæ, (Maranta, Canna, &c.,) and preserve them in baskets without their altering, when kept from moisture. The specific weight is 1.294 to 1.355; it swells and softens in water, which dissolves a part of it. The blackish-brown color of the guarana, its odor and taste, present some resemblance to the paste of the cacao, but without being oily. The acerb taste resembles that of rhatany, but with feeble bitterness. The fracture is conchoidal, cleft by the retraction of the parts, with brilliant fragments, which are blackish and prominent, by the side of irregular cavities.

The Indians rasp, in their journeys, the guarana, which they constantly take with them, by means of the rough bone of a large fresh water fish, *Sudis gigas* (the *vastres* of Cuvier.) This they unite with sugar and water, and the drink is antifebrile and refreshing.

* I am much indebted to M. Dechastelus, pharmacien of Paris, who has received this substance from Brazil in large quantities.

Guarana renders chocolate more tonic and strengthening, without sensibly altering its taste. The roots of this Paullinia are equally reported to be febrifuge.

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ART. LXVII.—ORGANIZATION OF MEDICINE AND PHARMACY IN RUSSIA.

A ukase, confirmed by the Emperor, December 28th, 1838, and promulgated by direction of the Senate, January 25, 1839, regulates in Russia everything in which the medical profession is interested. This regulation having been translated, and published in Germany by M. Ed. Siller, in the Repertory of Pharmacy of Buchner, we have been led to suppose that it would be well received, if the principal features of it were made known, particularly those portions which relate to pharmacy.

Let us in the first place remark, that in Russia, pharmaceutists are considered in the employ of the government, a circumstance which confers upon them great importance in the social hierarchy.

The examinations of medical practitioners, veterinary surgeons, and pharmaciens, and in general of all persons who exercise any department of the medical profession, are made by the Academies or Imperial Universities of Medicine and Surgery.

The examination takes place in full meeting of conference, or Faculty of Medicine.

Each Professor is the examiner upon the portion of science that he professes. He can be substituted for by an adjunct. In the absence of both, the faculty designates another person to perform the office. At the same time, each Professor present has the right of propounding questions upon all the subjects of the examination.

No person, whether a Russian subject or a foreigner, can practice either medicine, veterinary surgery, or pharmacy, without being provided with a diploma, emanating from an Academy or Imperial University of Medicine or Surgery.

There are three degrees of examination relative to pharmacy, to wit:

1. That of Assistant Pharmacien. *(Pharmacopœus Auxiliarius.)*

2. That of Provisor, (Purveyor.) *(Pharmacopœus substitutus.)*

3. That of Pharmacien. *(Pharmacopœus.)*

Physicians, veterinary surgeons, assistant pharmaciens and provisors, are divided into two orders, relatively to the extent of their acquirements, and do not pass from one order to the other without new examinations.

Title 1st. To be admitted to an examination for assistant pharmacien, it is necessary, 1st. To be prepared with sufficient knowledge upon the subjects which constitute the objects of instruction for the four first classes in the Colleges.—2d. To have served an apprenticeship of three years at least in a pharmacy of the crown, or in a free pharmacy.

The examinations are upon the following subjects:

a. In *Mineralogy*, the principal systems, the terminology, and principally the minerals which belong to pharmacy.

b. In *Botany*, the terminology and the principal systems.

c. In *Zoology*, the different systems, and principally the animals of which certain parts are employed in pharmacy.

d. In *Physics*, the general properties of bodies.

e. In *Chemistry*, the simple non-metallic bodies, the metals, the principal oxides, acids, salts and products, employed in medicine.

f. In *Pharmacognosy*, the substances most employed, their denomination, their origin, their distinctive characters.

g. In *Pharmacy general*, it is necessary to translate from the Latin Pharmacopœia, a passage pointed out by a Professor.

h. In *Pharmacology*, to indicate the ordinary doses of medicines of violent activity.

Finally, the candidate must give proof of practical information, by executing, under the eye of the examiner, four preparations assigned to him.

Title 2. The assistant pharmacien who wishes to obtain the grade of provisor, if he be of the first order, must remain two years longer, and three years if he be of the second order, in a shop of the crown, or a free shop. He must moreover, prove by certificate that he has followed in an Academy or University, a complete course of each of the sciences upon which the examinations are made.

The examinations refer to the same sciences as the preceding, but are pushed still further,

The candidate for the degree of provisor, must in addition have applied the principal remedies in cases which required immediate interference, and which are designated in an especial rule.

The theoretic examination being terminated, the candidate makes two pharmaceutical preparations and executes two chemical operations, under the inspection of the examiner.

Title 3. To be admitted to the grade of pharmacien, it is necessary, 1. To possess the grade of provisor; 2. To have practised in this capacity for two or three years, according to order, or to have kept a shop for the same space of time.

The examinations are upon the same subjects as the preceding; but a more extensive knowledge is required of the candidate, both in theory and practice. There must be evinced the capacity of executing different researches, or chemical analysis, and it must be proved that there is possessed the knowledge of book keeping and the commercial information requisite to keep an establishment. Finally, as a last test, three of the most important pharmaceutical preparations must be made, always under the inspection of one of the examiners. Provisors of the first order, distinguished by the good administration of a shop, or who have published works on pharmacy, chemistry, or natural sciences, honorably received by the scientific world, may obtain the degree of pharmacien without being subjected to examination.

By a general edict, it is prohibited pharmaciens from writing prescriptions and interfering with the treatment of patients, except in cases of danger to life, such as poisoning, fainting, hemorrhages, burns, &c., when immediate aid is needed, and a physician is expected.

This regulation, which comprises the most judicious measures, is a new proof of the importance that, among the nations of the North, is attached to the profession of pharmacy. It may be added, that if the preceding arrangements demand of the Russian apothecary the fullest guarantee of knowledge, they at the same time secure to him the price worthy of his services, a distinguished place in the social circle, and the consideration which should be the object of ambition to every one who exercises a liberal profession.

P. A. C.

Journ de Pharmacie.

MISCELLANY.

Kiesteine.—M. Nauche has given this name to a particular product of a gelatino-albuminous nature, which is found in the urine of women at the end of the first month of pregnancy. This principle is separated by repose alone, from the other matters of the urine. It is sufficient to place this fluid in a glass; at the end of several hours the kiesteine shows itself upon the surface, under the form of points of oblong filaments, which unite in a layer a line in thickness. A portion of this layer is precipitated to the bottom of the vessel, and there forms a white deposit, of a milky appearance. Another remains upon the surface of the urine, contracts adhesions with the sides of the vessel, and is converted into a solid membraniform substance.

The kiesteine furnishes a positive means of detecting pregnancy, even at its commencement, when the woman is in health. In diseases with purulent secretion, in the different dropsies, diabetes, in children with worms, the urine is often covered with an albuminous, fatty, or saline layer, which has some resemblance to that observed in pregnancy, but, with a little practice, they are distinguished at the first glance. The existence of these diseases ought, moreover, to put us upon our guard against all mistakes of this kind.

M. Nauche assures us, that he has frequently employed this method of determining pregnancy, in the case where it was far from being expected. He thinks that kiesteine is also found in animals under the same circumstances.

Emanuel Russeau has undertaken, at the *Garden of Plants*, experiments upon the same subject. He has found the same substance as M. Nauche in the urine of Apes during gestation. He has in vain sought for it in those who were not fecund—or in the urine of males.

Journ. de Chemie Med.

Upon Ligustrine, and the constituent parts of the Bark of the Ligustrum vulgare. By M. G. Potex.—In the bark of the Ligustrum vulgare I have discovered a peculiar substance. The following is the method of preparing it: The bark, well bruised, is boiled in pure alcohol, it is then distilled and the residue filtered, and made to undergo fermentation by means of yeast, to destroy the sugary matter. After this, it is filtered a

second time, and precipitated with milk of lime, to decompose the soluble magnesian salts. The precipitate is collected, the lime separated by sulphuric acid, avoiding an excess of acid, the liquid is evaporated to separate the sulphate of lime; the last traces of lime are removed by oxalic acid; the free acids, and the extractive matter, by neutral acetate of lead; and the surplus of this last removed by treating the filtered liquid with a current of sulphuretted hydrogen gas. Evaporation is next performed to remove the acetic acid, the extract is redissolved in a small quantity of alcohol, and the mannite is separated by crystallization. The extractiform residue is dissolved several times in cold strong alcohol to separate the remainder of the mucuso-sugary matter; finally it is allowed to evaporate.

The ligustrine is a yellow extractiform mass, bitter, hygroscopic, and retaining traces of acetic acid and mucoso-sugary substance. It is soluble in alcohol and water, but insoluble in ether and absolute alcohol. The metallic salts and the alkalies form no precipitate with it; with sulphuric acid there is obtained a superb azure color. When the solution is concentrated, the color is a deep indigo blue. By diluted sulphuric acid, these changes of color are not produced.

The constituent parts of Ligustrum vulgare are—ligustrine, mannite, fermentable sugar, muco-sugary matter, amylum, chlorophylle, bitter extractive, bitter resinous matter, tannin, albumen, salts principally with magnesia as a base, lignin.

Employment of Hydrated Peroxide of Iron as an antidote for Scheele's green. By Dr. Spaeth, of Esslingen.—An infant, three years old, having swallowed a spoonful of Scheele's green, (arsenite of copper,) very soon became attacked with violent vomiting, diarrhœa, violent pain in the belly, and insatiable thirst. He was in the first instance made to drink cold water, and then fifteen grammes of the peroxide of iron where administered to him, suspended in hot water. He took four doses of it. An hour after the employment of the antidote, both the vomiting and the diarrhœa had ceased, as well as the pain and the thirst; the next day all the symptoms of poisoning had ceased.

Gazette Medicale.

The Indian mode of preparing the Perfumed Oils of Jasmine and Bela.—Dr. Jackson, of Ghazeepore, in a letter to the editors of the Asiatic Journal of Calcutta, for June, 1839, says:—In my last communication on the subject of rose water, I informed you that the natives here were in the habit of extracting the scent from some of the highly smelling flowers, such as the jasmine, &c.; and that I would procure you a sample, and give you some account of the manner in which it is obtained. By the present steamer, I have despatched two small phials, containing some of the oil

procured from the Jasmine and Bela flower. For this purpose the natives never make use of distillation, but extract the essence by causing it to be absorbed by some of the purest oleaginous seeds, and then expressing these in a common mill, when the oil given out has all the scent of the flower which has been made use of. The plan adopted, is to place on the ground a layer of the flower, about four inches thick, and two feet square; over this they put some of the Tel or Sesamum seed, wetted, about two inches thick, and two feet square; on this again is placed another layer of flowers, about four inches thick, as in the first instance; the whole is then covered with a sheet, which is held down by weights at the ends and sides. In this state it is allowed to remain from twelve to eighteen hours; after this the flowers are removed, and other layers placed in the same way; this is also a third time repeated, if it be required to have the scent very strong. After the last process, the seeds are taken up in their swollen state and placed in a mill; the oil is then expressed, and possesses most fully the scent of the flower. The oil is kept in prepared skins, called dubbers, and is sold at so much per seer. The Jasmine and Bela (Jasminum Zamba) are the two flowers from which the natives in this district produce their scented oil; the Chumbul (Jasminum grandiflorum) is another, but I have been unable to procure any of this. The season for the manufacture is coming on. The present oils were manufactured a year ago, and do not possess the powerful scent of that which has been recently prepared. Distillation is never made use of for this purpose, as it is with the roses, for the extreme heat (from its being in the middle of the rains when the trees come into flower,) would most likely carry off most of the scent. The Jasmine, or Chymbele, as it is called, is used very largely among the women; the hair of the head and the body being daily smeared with some of it. The specimen that I send you costs at the rate of two rupees per seer.

Edin. New Phil. Journ.

Oil of Ergot—the Mode of Preparing it—its Physical and Chemical Properties.—Mr. Samuel Wright gives the following process as a convenient one for preparing the oil of ergot for ordinary purposes:—Digest the ergot in liq. potass. at a temperature of 120°–150°, until a perfect saponaceous solution be formed. The liquid is then to be diluted with half its weight of water, exactly neutralized with sulphuric acid, and submitted to distillation from a saline or an oil bath. The product is white, adhesive, and fatty-looking, almost free from empyreuma, and nearly tasteless.

The readiest and best, though unfortunately, the most expensive way of obtaining this oil, is, he says, by percolating ergot in a state of fine powder, with sulphuric ether. By allowing the ether to evaporate spontaneously, the oil of ergot is left in its purest form.

As thus prepared, he adds, it usually consists of two portions—the one,

colorless and translucent, the other, having a reddish-brown hue. The latter character is an acquired one, and simply dependent upon the age of the ergot. In old specimens, the oil is colored throughout, and often deeply; in recent ones, on the contrary, it is not unfrequently entirely free from color.

Its taste is oily, and slightly acrid, its odor is similar to that of ergot, though more agreeable, and neither heightened by acetic acid, nor destroyed by long contact with a clear plate of copper or of iron. When heated, it blackens rapidly, acquires a disgusting empyreumatic odor, like that of an old tobacco pipe, and an acrid biting taste. If the heat be long continued, complete volatilization takes place; but if the oil be suffered to cool, it thickens, solidifies slowly, and ultimately becomes resinous.

By long exposure to light and air, at a moderate temperature, it assumes a reddish-brown color, though it is little altered in either smell or flavor. The purple hue of ergot appears to be owing to the action of light and air upon the oil, aided by the free phosphoric acid. By mixing the colorless oil with flour and a little acid, and exposing the mass to air and sunshine for some weeks, I have succeeded in producing the distinct color of ordinary ergot. It will be remembered that the latter, when growing, is never darkened so long as it is completely shielded by the glume.

Oil of ergot is of less specific gravity than water, and when these are agitated together, the latter becomes slightly odorous, and the former is rendered somewhat opaque. It is soluble in all the ethers, alcohol, naphtha, and bisulphuret of carbon, from which it is imperfectly separated on the addition of water. It is dissolved by all the essential oils, and mixes intimately with some of the fixed ones, particularly almond and olive oil. It is likewise soluble in kreosote, caustic alkalies, earths, and ammonia. With the latter substances, it forms a soapy solution, from which it may be separated by an acid. Sulphuric, nitric, and hydrochloric acids in the dilute form, have little action upon it, but, when concentrated, they convert it into a deep brown or black mass. When long exposed to light and air, at a moderate temperature, the oil thickens, deepens in hue, and diminishes in strength; yet, if kept in a stoppered bottle, it is patient of preservation, and will retain its activity for years. On this account, as also from the fact of its embodying all the active properties of ergot in a safe and manageable form, Dr. W. is persuaded it will be found a much more advantageous officinal preparation than the crude drug.

Am. Journ. Med. Sci., from Edin. Med. and Surg. Journ., July, 1840.

On the Hydrocyanoferrate of Quinine.—Notwithstanding the valuable febrifuge virtues of the sulphate of quinine, it is well known that it occasionally fails. In such cases the hydrocyanate of quinine has been used

with good effects. But as this is a salt subject to decomposition, Signor Bertozzi of Cremona, has proposed to substitute the hydrocyanoferrate of quinine, the powers of which over the worst forms of intermittent fever have been completely established.

Dr. Zaccarelli has prescribed this new medicine in a great number of cases in place of sulphate of quinine. It is found to cut short tertian and quartan fevers; and, what is well worthy of the attention of physicians, it has principally succeeded in cases where the sulphate of quinine has failed. Dr. Carioli has also confirmed the febrifuge properties of this pre paration.

The following is given by Bertozzi as the most economical process for obtaining it. One part of sulphate of quinine is to be triturated in a glass mortar to an impalpable powder; a part and a half of the ferro-prussiate of potash, previously dissolved in six or seven parts of distilled water, is to be mixed by careful agitation, and the whole exposed in a flask to heat, stirring the mixture carefully until it arrives at the boiling point. In proportion as the liquid becomes transparent, there is precipitated to the bottom and sides of the flask a substance of a greenish-yellow color, having an oily consistence. Having poured off the liquid portion, this substance is to be washed with distilled water, and then dissolved in very pure alcohol at 100° Fahr., and immediately filtered. On evaporating the alcohol, a mass, confusedly crystallized in needles, is left, the weight of which amounts to three-fourths of the sulphate of quinine used. This is the hydrocyanoferrate of quinine.

When in small fragments this substance is of a pea-green color, and of an intensely bitter taste. It dissolves in cold, but better in hot alcohol, and is precipitated from its solution almost entirely by water. It is decomposed by sulphuric acid, and by the tincture, infusion, and decoction of cinchona. It has been given in doses of three grains and a half, repeated as occasion required.

Ibid., from Dublin Journ. Med. Sci. July, 1840.

Tonic Astringent Pills of Walch.—The following is the formula for these pills:—℞. Terebinth, Venet. Extr. Gentian. *aa* ʒij; Ferri Sulphat. Kino *aa* ʒiss. M. To be made into pills of a grain and a half each. These pills are said to be very efficacious in the cure of gonorrhœa and of chronic leucorrhœa. The dose is four pills three or four times a day.

Ibid., from Journ. des Connaiss. Méd. Prat. et de Pharm., June, 1840.

Action of Albumen on Corrosive Sublimate.—The change induced by albumen on corrosive sublimate when taken internally, is one of the most interesting problems in chemistry. It is universally considered as an antidote if taken sufficiently early, but how it acts seems at present to be a matter in doubt. I believe Dr. Bostock was one of the first who noticed

the action of these bodies on each other, and he states explicitly, that even when heat was applied, the precipitate is a compound of albumen and corrosive sublimate. (*Nicholson's Journal*, vol. xiv. p. 142.) Dr. John Davy, to whom I am indebted for this reference, advocates a similar opinion in his Physiological and Anatomical Researches. According to his experiments, no muriatic acid was disengaged or produced, nor could he induce a union of albumen with either the protoxide or peroxide of mercury. It has, however, been generally credited on the authority of Orfila, that a decomposition takes place, and that the resulting compound consists of albumen, muriatic acid and calomel. He grants, however, in the third edition of his Leçons, (vol. i. p. 301,) that the resulting calomel is never applied in the form of powder to the membranes of the alimentary canal, nor has it the physical properties of calomel, since it is intimately combined with the substance which has been the cause of its formation, and thus constitutes a ternary chemical compound. I have also mentioned, in another place, the cases of Olivier and Barruel, who, in persons poisoned with corrosive sublimate and to whom milk and albumen had been administered as antidotes, could detect no calomel; but the tests indicated the presence of corrosive sublimate, a portion of which was probably still undecomposed.

Dr. Turner (Chemistry, 5th edit., p. 937,) also states, that Rose, in a late analysis, proved the resulting precipitate to consist of oxide of mercury and albumen.

The latest experimenter is Lassaigne. He asserts, from a series of observations, that in the action of albumen on metallic salts, *this principle unites directly with these compounds without producing any decomposition.* It forms compounds with them, which are insoluble in water, when these bodies are in certain proportions, but susceptible of solution when the albumen or the metallic salt is in excess. And these compounds he denominates *albuminates.* (*American Journal of Pharmacy*, vol. xii. p. 170, from the *Journal de Chimie Medicale.*)

We have reason to fear, from these results, that the value of albumen, as a *chemical* antidote, will be somewhat impaired. Still its use should not by any means be omitted, but it should be administered as early as possible and in large quantities. T. R. B.

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